

MARINE REVIEW.

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No. 25.

Important Changes in the Ore Business.

More changes leading to a consolidation of big interests in the iron ore and vessel business have been closed up within the past few days. Details of the large ore and transportation deal between John D. Rockefeller and the Carnegie Steel Co. are coming to light. It is officially announced that the Mountain Iron mine, the principal Rockefeller property on the Mesabi range, has been leased to Mr. Carnegie, or rather to the Oliver Mining Co., which he controls, for a period of fifty years, which means practically a sale of the property. This mine, with the Oliver of the same range, is capable of producing easily 1,200,000 tons of ore annually, and it is understood that there is also an arrangement between the two interests whereby the ore of the two mines is to be moved over the Rockefeller railway to Duluth and in Rockefeller ships to Ohio ports, but there is no positive information on this score. The Carnegie Steel Co. now controls the two best mines on the Mesabi range, and these two properties are capable of producing all the Mesabi ore that the company can use for some time to come.

A circular from S. S. Curry, president of the Metropolitan Iron & Land Co., announces the appointment of Pickands, Mather & Co. of Cleveland as general sales agents for the company, for the handling and sale of the Norrie and Pabst ore, formerly handled by E. C. Pope of Cleveland. The circular adds that by a mutually satisfactory arrangement Mr. Pope will hereafter be associated with Pickands, Mather & Co. The Norrie and Pabst mines are capable of producing a million tons of ore annually, and this agency will, of course, be a big acquisition to the business of Pickands, Mather & Co., who are already handling as much ore as the biggest of the Cleveland agencies and are operating about forty steel ships.

It is also announced that Mr. Frank Billings, well known in connection with large manufacturing enterprises in Cleveland, will take charge of the ore and pig iron business of Tod, Stambaugh & Co., which was under the direction of the late John Tod.

Battle of the Boilers.

Immediately following the announcement that the British cruiser Powerful, which is fitted with water tube boilers, had proved herself, on her steam trials, to be the fastest vessel of her class in the English navy, there was quite a stir in eastern engineering circles. The New York Herald used lengthy articles on the subject as leaders in three issues of last week and added interviews with the best known ship builders and marine engineers. Interviews with Gen. Hyde of the Bath Iron Works and Charles H. Cramp, president of the Wm. Cramp & Sons Ship & Engine Building Co. of Philadelphia, were somewhat surprising. Mr. Cramp said:

"I have no doubt that the water tube boiler has come to stay as far as naval construction abroad is concerned. One great advantage claimed by the naval promoters of this type is that at the end of about ten or fifteen years the boiler, if of good design, is as good as new, as the tubes have been replaced from time to time or one by one as they gave out, thus keeping up the uniformity and integrity of its first construction. This, I think, is a strong point in their favor, as after a few years the best of the old-fashioned or cylindrical boilers must deteriorate, thereby lowering the power and speed without reducing the consumption of fuel in a proportionate degree. When the cylindrical boilers have to be replaced the work must be done as a whole, and the cost of new boilers in vessels like one of the great transatlantic liners would be so great as to leave doubts whether it would not be better to build a new ship. This cost is due to tearing out foundations, opening up the decks, destroying or defacing cabin work, electric installation and ventilation plant, and would be largely in excess of the cost of the new boilers alone. We should also consider the great loss of time in making the changes. On the other hand the general effect of the substitution of new parts from time to time in the water tube boiler is to keep it practically new. If it was desired to replace the water tube boiler with a better one the parts of the old one could be

taken up the hatches, and the new one could be taken down the same way without disturbing a single element of hull construction. Whether the advantages, some of which are enumerated above, offset the disadvantages due to increased number of parts and the necessity of greater care in operating is now under consideration by the steam engineering world. I look for further improvements in water tube boilers, sufficient to decide this question in their favor, in the near future. In general, I would say that the present time is a period of transition, the length of which can be determined only by further improvements in the water tube system. The cylindrical boiler has been developed to its ultimate point and is hence at a standstill. I consider that the thickness and weights required in the St. Paul and her class for the high pressures of quadruple expansion have reached the limit of practicable construction under the cylindrical system, and that therefore any further progress in the direction of high pressures and economy of fuel must be made on water tube lines."

Miers Coryell, who has attained prominence in water tube boiler circles in this country through his connection with Belleville, the French inventor, directs attention to a change of fire-room forces which he says is certain to accompany the advancement of the water tube boiler. Fire-room forces must be improved, according to his view of the immediate future, and he adds that the adoption of the Babcock & Wilcox boiler for big vessels in this country will bring about this change here, just as the Belleville and other types will require it elsewhere. Mr. Coryell, in fact, seems now to look upon the Babcock & Wilcox boiler as the coming water tube boiler here, on account of its merits, and also from the fact that it is an American product. He says the Babcock & Wilcox people are securing an advantage both in England and this country in the number of merchant ships in which they are fitting their boilers. As Americans he congratulates them upon this success, but he adds that they are meeting with little competition in merchant work from the English manufacturers of the Belleville boiler, Messrs. Maudslay Son & Field, who are said to have more than two year's work ahead on boilers for the German, Italian, Spanish and Russian navies, and are therefore not in a position to solicit merchant work. Referring more in detail to improvement of fire-room forces Mr. Coryell says: "It is evident to all practical engineers that the higher pressures now coming into general use will force a more intelligent management in the fire-rooms, in order to secure complete combustion by the observance of natural laws relating thereto, which in one regard is the regulation of air supply as the fires demand it, varying as the gases are set free from the fuel and never representing a uniform quantity. It will, of course, be impossible to improve the firemen as a whole. The change must come through mingling a more intelligent element with the ordinary firemen. The new men, who will have general direction in the fire-hold, may be termed fire-room engineers. The intelligence required of them is such that they should rank with first or second assistant engineers and be given the same wages. Managers of ships must soon realize that the burden of caring for such auxiliaries as electric lighting plants, steering engines, etc., together with possibly ventilating and refrigerating plants, involves so many calls upon engineers that it is impossible for them to give proper attention to the fire-room, and high coal bills are the result."

In a recent interview in one of the Duluth papers Capt. Alex McDougall again expresses the opinion that the vessel owners of the lakes, together with the United States engineers who are carrying on St. Mary's river improvements, are to be badly disappointed over their efforts to secure a 20-foot channel. He holds, of course, that the principle of dredging the river to secure deeper draft has not had the effect that was expected of it, and he says that the increased draft in the Sault river during the latter part of the past season may have been due in part to the dredging but it was mainly on account of a high stage of water brought on by natural causes. When we have another low-water period, he says, we will be again down practically to the light draft of previous years.

Lake Superior Commerce Complete.

The United States canal at Sault Ste. Marie closed Dec. 8, and the Canadian canal, which was held open for local traffic, closed two days later, on the 10th. By combining monthly statements of the two canals it is found that the total number of vessel passages to and from Lake Superior during 1896 was 18,615, against 17,956 in 1895 and 14,491 in 1894. The number of tons of freight moved was 16,239,121, against 15,062,580 in 1895 and 13,195,860 in 1894, and the registered tonnage of vessels was 17,249,418, against 16,806,781 in 1895 and 13,110,366 in 1894. Thus the freight tonnage of 1895 is exceeded by 1,176,541, while the excess of registered tonnage is only 442,637. It will thus be seen that with deeper draft in the Lake Superior trade the increased carrying capacity of the big freighters is again making up for the difference that existed last season between registered and freight tonnage. The movement of grain of all kinds aggregated 90,704,534 bushels, against 54,546,944 bushels in 1895. Other freight items are also enumerated separately in the following table:

LAKE SUPERIOR COMMERCE—A COMPARISON OF CANAL STATISTICS FOR THREE YEARS PAST.

| ITEMS. | Designation. | Season of 1896. | Season of 1895. | Season of 1894.* |
|------------------------------|------------------|-----------------|-----------------|------------------|
| Vessels..... | Number..... | 18,615 | 17,956 | 14,491 |
| Lockages..... | Number..... | | 7,734 | 6,431 |
| Tonnage, registered..... | Net tons..... | 17,249,418 | 16,806,781 | 13,110,366 |
| Tonnage, freight..... | Net tons..... | 16,239,121 | 15,062,580 | 13,195,860 |
| Passengers..... | Number..... | 37,066 | 31,656 | 27,236 |
| Coal, hard..... | Net tons..... | 397,210 | 440,477 | 532,870 |
| Coal, soft..... | Net tons..... | 2,626,130 | 2,133,885 | 2,264,314 |
| Flour..... | Barrels..... | 8,882,858 | 8,902,302 | 8,965,773 |
| Wheat..... | Bushels..... | 63,256,463 | 46,218,250 | 34,869,483 |
| Grain other than wheat..... | Bushels..... | 27,448,071 | 8,328,694 | 1,545,008 |
| Manufact'd and pig iron..... | Net tons..... | 121,872 | 100,337 | 60,659 |
| Salt..... | Barrels..... | 237,515 | 269,919 | 237,461 |
| Copper..... | Net tons..... | 116,872 | 107,452 | 99,573 |
| Iron ore..... | Net tons..... | 7,909,250 | 8,062,209 | 6,548,876 |
| Lumber..... | M. Ft. B. M..... | 684,986 | 740,700 | 722,788 |
| Silver ore..... | Net tons..... | 240 | 100 | 412 |
| Building stone..... | Net tons..... | 17,731 | 23,876 | 21,417 |
| Unclassified freight..... | Net tons..... | 520,851 | 463,308 | 451,185 |

* U. S. canal only; Canadian canal did not open until late in 1895.

Experimental Model Tank.

Chief Constructor Hichborn of the navy makes another plea in his annual report, just at hand, for funds to complete the tank in which it is proposed to try models of vessels. He says:

"The last act making appropriations for the naval service contained an appropriation of \$7,500 toward the construction of an experimental model tank at the Washington navy yard, under the bureau of construction and repair, the value of which has been repeatedly set forth by the bureau in its annual reports. Preparation of plans for this establishment are well advanced. After careful examination by boring and driving test piles, a satisfactory site has been selected at the navy yard, and preliminary work on the ground is now progressing. It is hoped that the next congress will appropriate the balance necessary to complete this important installation. As soon as the money becomes available work can be expedited. It is but proper to state that the bureau is in receipt of several communications from private ship builders throughout the country upon this subject, expressing gratification at the prospect that the United States was at last in a fair way to be on a par with foreign nations in this important respect."

Facts About the Season of 1896.

The steamer City of Berlin, the first of the grain fleet to go out from Chicago, left for Fairport on April 14.

Steamer Pahlow, first boat to pass the Straits of Mackinac, was reported up at that point at 6 a. m., April 16. The City of Berlin, first boat down, passed at 12:30 p. m., the same day.

The first boats to pass through the St. Mary's Falls canal were the tugs Merrick and Thompson, which arrived up at 4 p. m., April 18.

The last boats at the Sault were the Minnesota company's steamer Matoa and her consort, the Marcia, which passed up on the evening of Dec. 8. These were also the last vessels to reach Duluth, where they arrived on the 11th. The last vessel to leave Duluth, bound down, was the steamer Penobscot, early on Dec. 7.

At Escanaba the first arrival was the steamer Zenith City on April 18.

On April 19 the steamer Thomas Davidson led the Chicago grain fleet into Buffalo.

On April 23 the steamer Andaste arrived at Cleveland with the first cargo of ore that reached a Lake Erie port, and on the same date the Anchor liner Mahoning was honored as the first arrival at Duluth, although the canal at the Sault had been open since the 18th. Vessels bound to Port Arthur did not arrive there until April 27, when three of them, the steamers Olympia, Pontiac and Louisiana all worked their way in together.

The Welland canal was opened April 27, and closed officially on Dec. 15, although the last passage of importance was the steamer Algonquin down-bound on Dec. 11.

The last vessel to leave Lake Erie with soft coal was the steamer Aurora, which cleared from Huron for Sheboygan on Saturday Dec. 12.

May 1 was the date of opening and Dec. 1 the date of closing the Erie canal.

The steamer Ira H. Owen, which left Chicago Dec. 12, was the last boat to leave that port and the last boat down at the Straits and through the rivers. She passed the Straits Dec. 14. The Owen was paid the biggest Chicago freight of the season.

At Ashland the last vessel to leave was the steamer Linden, Nov. 27; at Two Harbors, the steamer Castalia, Nov. 29; at Marquette, the Kaliyuga and consort Fontana, Dec. 6, and at Gladstone the steamer Hadley, Dec. 10.

TABLES OF DATES ON WHICH NAVIGATION OPENED AND CLOSED AT PRINCIPAL POINTS ON THE LAKES.

| YEAR. | ST. MARY'S FALLS CANAL. | | DULUTH. | |
|-----------|-------------------------|---------|----------|---------|
| | Opened. | Closed. | Opened. | Closed. |
| 1885..... | May 6 | Dec. 2 | April 27 | Nov. 29 |
| 1886..... | April 25 | Dec. 4 | May 7 | Dec. 14 |
| 1887..... | May 1 | Dec. 2 | May 4 | Dec. 28 |
| 1888..... | May 7 | Dec. 4 | May 11 | Dec. 31 |
| 1889..... | April 15 | Dec. 4 | April 11 | Dec. 4 |
| 1890..... | April 20 | Dec. 3 | April 16 | Dec. 8 |
| 1891..... | April 17 | Dec. 8 | April 30 | Dec. 7 |
| 1892..... | April 18 | Dec. 6 | April 20 | Dec. 6 |
| 1893..... | April 29 | Dec. 6 | May 1 | Dec. 8 |
| 1894..... | April 17 | Dec. 6 | April 18 | Dec. 5 |
| 1895..... | April 25 | Dec. 11 | April 27 | Dec. 10 |
| 1896..... | April 18 | Dec. 8 | April 23 | Dec. 12 |

| YEAR. | STRAITS OF MACKINAW. | | WELLAND CANAL. | |
|-----------|----------------------|--|----------------|----------|
| | Opened. | | Opened. | Closed. |
| 1885..... | May 5 | | May 7 | Dec. 9 |
| 1886..... | April 21 | | April 19 | Dec. 1 |
| 1887..... | April 17 | | May 4 | Dec. 10 |
| 1888..... | May 4 | | April 23 | Dec. 8 |
| 1889..... | Mar. 25 | | April 16 | Dec. 1 |
| 1890..... | April 8 | | April 15 | Dec. 10 |
| 1891..... | April 15 | | April 20 | Dec. 16 |
| 1892..... | April 3 | | April 19 | Dec. 12 |
| 1893..... | April 17 | | April 24 | Dec. 11 |
| 1894..... | April 2 | | April 19 | Dec. ... |
| 1895..... | April 11 | | April 20 | Dec. 12 |
| 1896..... | April 16 | | April 27 | Dec. 15 |

AT BUFFALO AND ERIE CANAL.

| YEAR. | Lake Opened. | Canal Opened. | Canal Closed. | Number of days Canal Open. |
|-----------|--------------|---------------|---------------|----------------------------|
| 1885..... | May 3 | May 11 | Dec. 1 | 204 |
| 1886..... | April 17 | May 1 | Dec. 1 | 214 |
| 1887..... | April 17 | May 7 | Dec. 1 | 207 |
| 1888..... | April 28 | May 10 | Dec. 3 | 207 |
| 1889..... | April 10 | May 1 | Dec. 1 | 214 |
| 1890..... | Mar. 31 | April 28 | Dec. 1 | 216 |
| 1891..... | April 12 | May 5 | Dec. 5 | 214 |
| 1892..... | April 7 | May 1 | Dec. 5 | 219 |
| 1893..... | April 15 | May 3 | Nov. 30 | 212 |
| 1894..... | April 1 | May 1 | Nov. 30 | 214 |
| 1895..... | April 16 | May 3 | Dec. 5 | 217 |
| 1896..... | April 19 | May 1 | Dec. 1 | 215 |

Low holiday rates will be in effect via the Nickel Plate road on Dec. 24, 25, 31, and Jan. 1, 1897. Tickets will be good returning until Jan. 4. A splendid opportunity of spending Christmas or New Year's day with the home folks and friends.

Fred. C. Smith.

The most important work in the offices of the ore sales agents of Cleveland who handle the entire product of the Lake Superior mining region, which has now reached ten million tons annually, is that of providing for the transportation of this vast quantity of ore; for the storage of a large part of it on dock, and for its movement to furnaces



direct during the summer and from dock during the winter. The work of chartering vessels for this service is in itself a very important task, but there are numerous other duties involved in the business that demand the attention of men who are known to vessel owners all over the lakes. All of them are young men, noted for shrewdness and a careful application to the great amount of detail that is involved in this work. Fred C. Smith, whose death was announced on Friday last, was one of these young men. He had been for thirteen years associated with Mr. E. C. Pope, who represents the Metropolitan Land and Iron Co., which controls the Norrie and other mining properties on the Gogebic range. The transportation of nearly a million tons of ore in a single year had been under his direction. Mr. Smith was thirty-six years of age. He had advanced from a moderate clerkship to a creditable standing among Cleveland business men, and with interests in several large vessels, as well as a remunerative position secured to him on account of his knowledge of the ore business, he was planning for a comfortable future when death came suddenly from an attack of pneumonia.

It is, of course, well known that Capt. James Davidson of West Bay City is ready at any time to sell any of the fleet of wooden vessels that have been built or are now building at his ship yard. He is asking \$90,000 each for the big schooners and \$20,000 each for the harbor tugs, but on a cash basis the schooners could probably be bought for \$80,000 each and the tugs for \$18,500 each. Several of the harbor tug companies are short of good boats, but the tug companies are not wealthy concerns as a rule, and they are not inclined to undertake additions to their fleets, in view of the prices asked for these tugs and the figures quoted by builders who might put up steel boats.

Another big steel passenger and freight steamer, the Creole, built by the Newport News Ship Building & Dry Dock Co., has just been turned over to her owners, the Cromwell Line, and will ply between New York and New Orleans. The Creole was designed by Horace See of New York and is 375 by 44 by 32½ feet. Her triple expansion engine has cylinders 28, 44 and 74 inches diameter with a common stroke of piston of 54 inches. There are three double-ended cylindrical boilers and the propeller is of manganese bronze. The ship has accommodations for 75 first-class and 150 second-class passengers.

Capacity per week, of all pig iron furnaces in blast throughout the country increased from 124,077 tons on Nov. 1 to 142,278 tons on Dec. 1, but the production is still very much behind the maximum of Nov. 1, 1895, which was 217,306 tons.

Progress of the Steel Ship Industry on the Lakes.

A further examination of the report of the United States commissioner of navigation, which has just been received in book form, shows that unless some radical measures are undertaken to encourage the building of vessels for foreign trade, there will soon be no comparison between the number of big vessels owned on the seaboard and those owned on the lakes. It has been shown on several occasions of late that the aggregate tonnage of steam vessels of the largest class owned on the lakes is greater than the combined tonnage of vessels of the same class owned in all other parts of the country. With each report from the commissioner of navigation the lakes are credited with a gain in this regard. Thus it is shown by the latest report that the number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that 51 per cent. of the best tonnage in all the United States is owned on the lakes. A summary proving this statement follows:

STATEMENT SHOWING NUMBER AND TONNAGE OF STEAM VESSELS OF
1,000 TONS AND OVER OWNED IN THE UNITED STATES
ON JUNE 30, 1896.

| Districts. | Number of vessels. | Gross tonnage. |
|-------------------------------|-----------------------|-------------------|
| Atlantic and Gulf coasts..... | 257 | 573,841.86 |
| Pacific coast..... | 45 | 92,466.77 |
| Northern lakes..... | 383 | 711,034.28 |
| Western rivers..... | 13 | 18,895.92 |
| Total | 698 | 1,396,238.83 |

This prestige held by the lakes over other parts of the country is due, of course, to the steady progress in the building of steel ships, which are being increased in size each year. Although the lakes had practically no steel vessels ten years ago, this report shows that on June 30 last 226 steel vessels of 380,987.49 gross tons were owned in lake ports, and the number has been increased since that date by a dozen or more that have gone into commission, with seventeen additional on the stocks to come out next spring. Of the 226 vessels owned here on June 30, 1896, 189 were steam vessels and their gross tonnage was 330,698.76, or an average of 1,749.73 tons. From the same source of information it is learned that the classification of the entire lake fleet on June 30, 1896, was as follows:

| | Number. | Gross Tonnage. |
|----------------------------|---------|-------------------|
| Steam vessels | 1,792 | 924,630.51 |
| Sailing vessels and barges | 1,125 | 354,327.60 |
| Canal boats | 416 | 45,109.47 |
| Total | 3,333 | 1,324,067.58 |

It is one thing to design and build machinery, but quite a different thing to keep it in such a condition that it may be ready to respond to the calls that may be made upon it under all conditions, and naval machinery is of such a character that it is only by the exercise of constant vigilance and the greatest care that it can be expected to be kept in readiness for such calls. If the number of trained men is not sufficient for this purpose, the efficiency of a ship as a whole is lowered, and the money which has been expended on her construction to produce the very qualities which were considered of paramount importance has been practically wasted.—Report of Engineer-in-Chief Mellville, U. S. N.

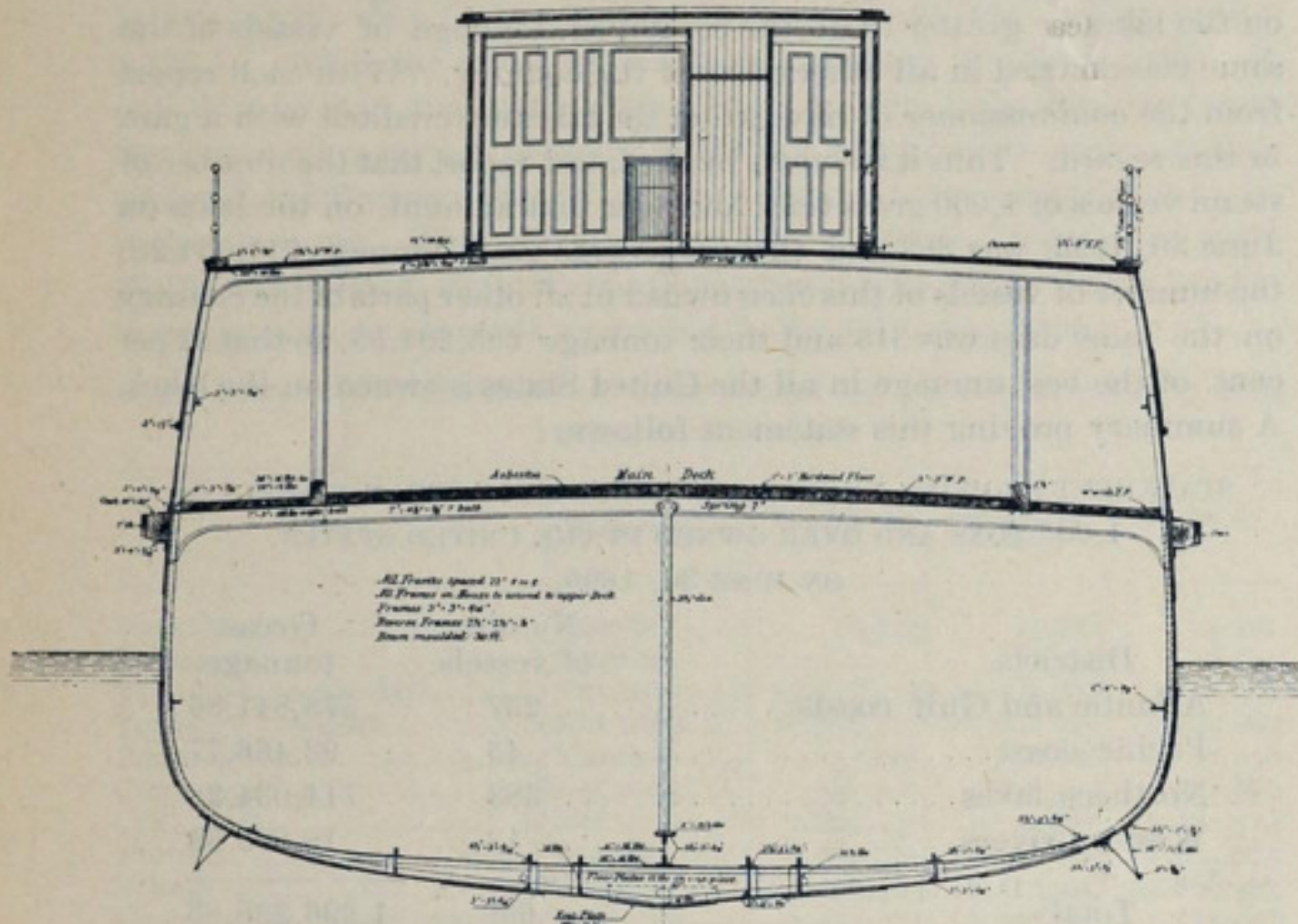
In one of the new buildings of the Ludlow Valve Mfg. Co. of Troy, N. Y., the Berlin Iron Bridge Co. of East Berlin, Conn., is erecting a runway for a twenty-ton electric traveling crane. The crane has a clear span of 55 feet and the length of runway is 160 feet. The track on which the crane runs is supported by heavy columns and girders of steel.

Admiral Walker of the United States light-house board, who is soon to retire from the navy, was when a young officer a great favorite with Farragut, who is said to have never written out orders for the young lieutenant, merely outlining them, and leaving the details to his discretion.

The Nickel Plate road will discontinue trains 18, 19, 20 and 21 between Cleveland and Lorain on and after Dec. 14, 1896. 414 Dec. 17

Two Twin-Screw Light-House Tenders.

As announced in previous issues of the Review, the United States light-house board will, on the 30th inst., receive proposals for the construction of five new vessels, two of which are light-house tenders, or inspectors' boats, and three light-ships. In each case these vessels are to be delivered within ten months from the date of approval of contracts. For each of the three light vessels \$80,000 has been ap-



AMIDSHIP SECTION, NEW LIGHT-HOUSE TENDERS.

propriated, and \$75,000 each for the two tenders, so that the contracts as a whole, including cost of inspection, etc., involve \$390,000.

The light-house tenders, of which plans are presented on this page, are to be duplicate twin-screw steel steamers, and will be named Mayflower and Mangrove. One of them will be stationed at Boston and the other at Key West, Fla. They are to be delivered on the Atlantic coast. A description of one will do for both. Dimensions

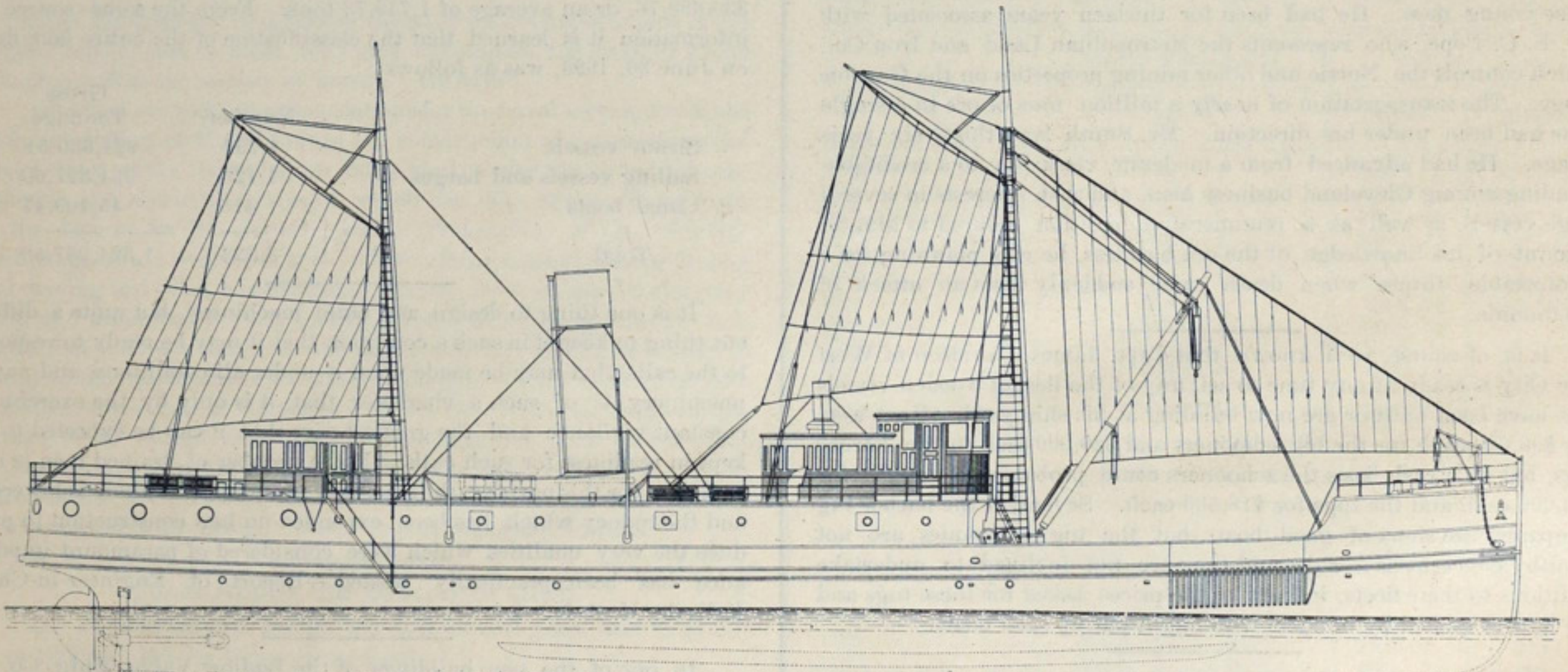
boilers, 9 feet diameter and 17 feet in length, are each to have two Fox corrugated furnaces of 42 inches mean diameter. The two propellers are to be of 7 feet diameter and suitable pitch.

Hollow-forged Shafts for River Steamers.

The Bethlehem Iron Co. of South Bethlehem, Pa., has recently invaded a new field with their hollow forged shafts. They have been introducing them on the Mississippi and Ohio rivers for stern-wheel steamers. Last week they closed a contract with the Pittsburg & Cincinnati Packet Line of Cincinnati, for a hollow forged nickel-steel oil-tempered shaft 38 feet 9 inches long and 14 inches outside diameter, with 7-inch hole running through it. Such a shaft is 3,500 pounds lighter and three and a half times stronger than the shaft which ordinarily would be placed in such a vessel, which would be made solid of wrought iron. This shaft goes into the new vessel which this company is having built at the Cincinnati Marine Railway. The Bethlehem company also sold a shaft recently to C. Jutte & Co. through Shook, Anderson & Co. of Pittsburg. They are also arranging to put a similar shaft into the new steamer which the Mississippi Valley Packet Co. of New Orleans will have built shortly.

In a paper read recently before the Western Society of Engineers by Mr. H. F. J. Porter, general western sales agent of the Bethlehem company, he spoke of these hollow forged shafts which he was introducing on the Mississippi and Ohio rivers and said that as compared with a wrought iron shaft 14 inches in diameter and 30 feet long, whose strength would be taken as unity, a solid steel shaft would be one-third stronger. A solid nickel-steel shaft would be one and one-half times stronger. A steel shaft of the same outside diameter with a 3½-inch hole through it and oil-tempered would be twice as strong. A hollow nickel-steel shaft of the same type would be three times as strong. A hollow forged steel shaft of the same weight but of 22 inches outside diameter and with a 17-inch hole through it would be three times as strong and if oil-tempered four and a half times as strong. If made of nickel steel it would be six times and if oil-tempered eight times as strong.

It was proposed at a meeting of the judiciary committee of the house of representatives, Tuesday, that the United States court for



SIDE ELEVATION PLAN OF NEW LIGHT-HOUSE TENDERS.

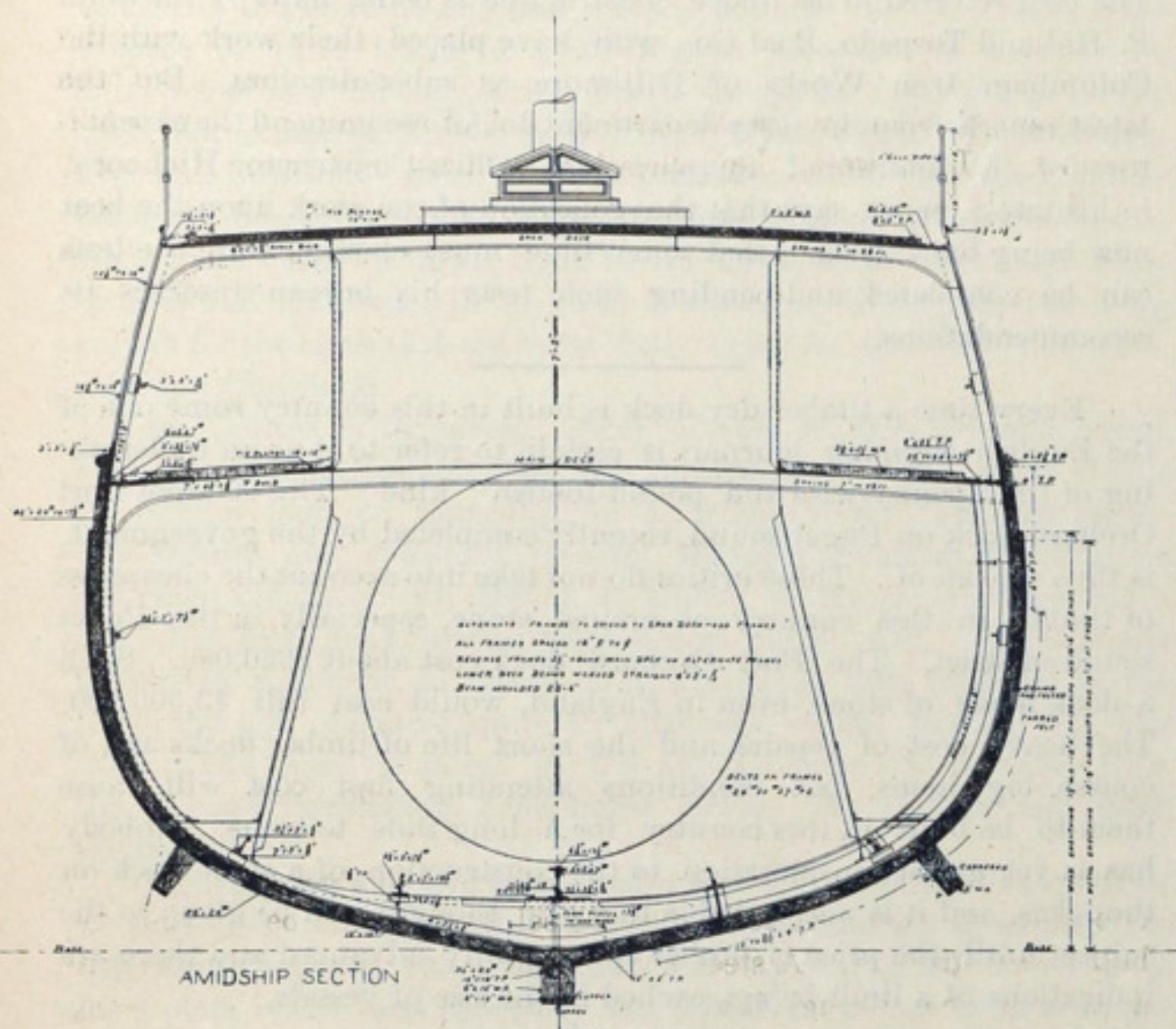
are: Length over all, 164 feet; length from inside of rudder post to inside of stem, 155 feet; beam, molded, 30 feet; depth of hold from top of beam to top of keel plate, 11 feet 10 inches. There will be five water-tight bulkheads and the vessel will be schooner rigged. Deck houses and quarters for officers and crew are not elaborate, but hard wood finish is provided in some parts and the specifications generally provide for first-class vessels as regards the general outfit, as well as the construction. The ships are to be furnished complete in every particular, the specifications going into the smallest details. Engines are to be twin inverted surface condensing, 26 inches diameter of cylinder by 30 inches stroke. Two multitubular straight-flued marine

the northern district of New York hold special sessions in the winter and spring of each year at Buffalo for the hearing of such admiralty cases as might be brought before it, affecting the interests of the great lakes. The committee regarded the proposition favorably, but hesitated about the necessary expenditure of money. It is thought, however, that the committee will take favorable action in the matter, as the convenience of having cases heard at Buffalo would be a big advantage to shipping interests on the lakes.

H. C. Coulby, superintendent of Pickands, Mather & Co.'s steamship department, has gone to England on a short vacation.

Three Composite Light-Ships.

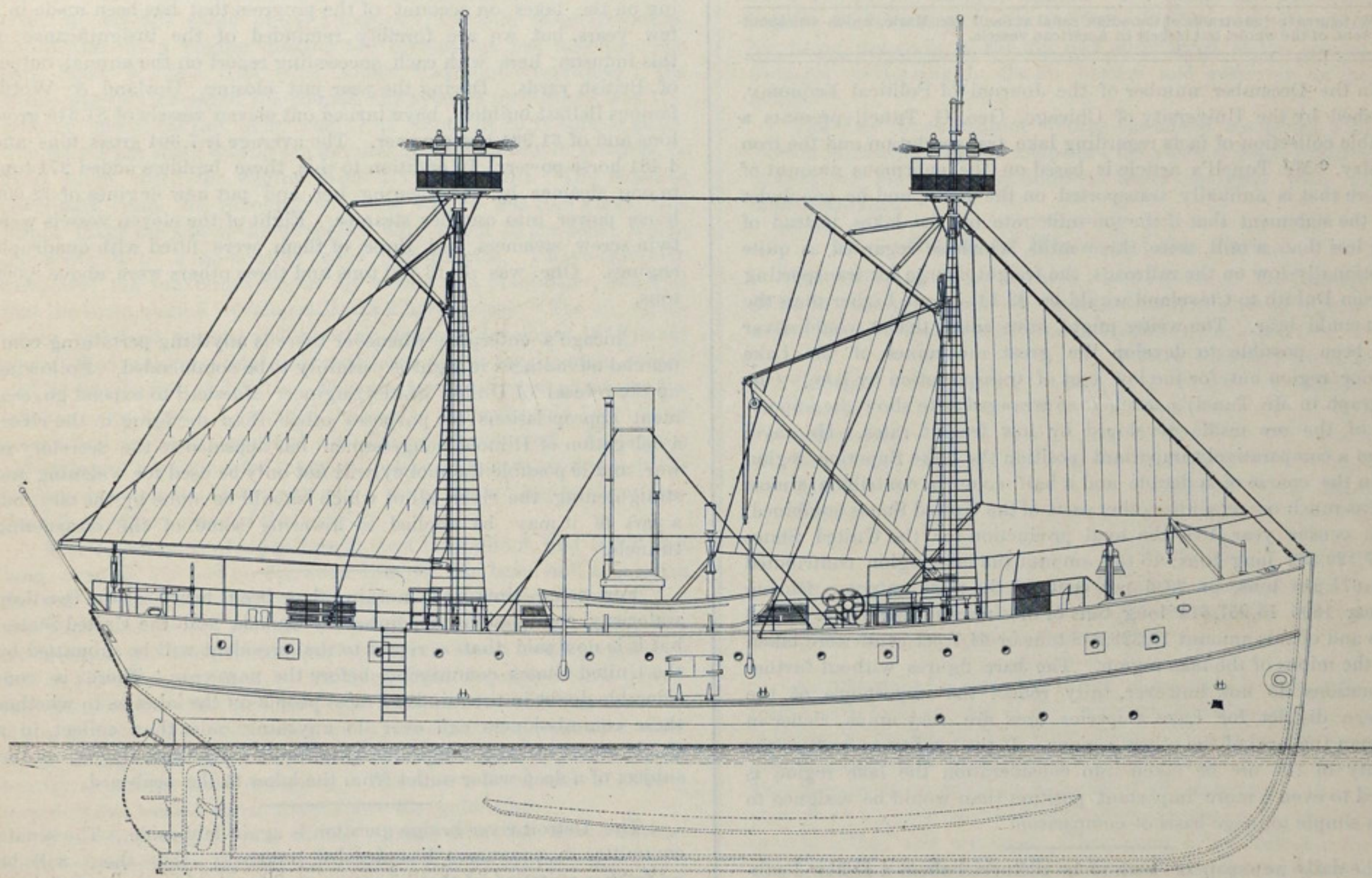
The three light-ships referred to in the article on the opposite page about vessels on which the United States light-house board has asked for proposals, are to be of composite construction and will have suffi-



AMIDSHIP SECTION OF NEW LIGHT-SHIPS.

be of steel with steel plate keel, steel bilge strake, and steel sheer strake; wood planking from the keel up to the sheer line at the main deck, and from that point up to the spar deck to be steel plate. Frames, floors, keelsons, stringers, beams, sheer strake, bilge strake, strapping, keel plate, etc., are to be of steel; stem, sternpost, rudderpost, rudder, false keel, shoe, sheathing, gripe or stern and bilge keels to be of seasoned white oak; keel, planking, and dead wood to be of seasoned long-leaf Georgia or Florida pine. Fastenings in plank, keel, and deadwood to be of galvanized iron; in the wood sheathing, composition spikes. The metal sheathing to be 26, 28 and 30-ounce metal, double-punched. The outfit is to include a steam windlass, steam hoister, three anchors, steam heating apparatus and well-arranged quarters for crew that will involve quite an outlay in the general equipment. The main engine will be of the vertical inverted, surface-condensing type, with a single cylinder. All its parts must be proportioned to resist the strains due to a maximum working steam pressure of 100 pounds per square inch and 150 revolutions per minute for any duration of service. The steam cylinder will be 20 inches diameter, with 22 inches stroke or piston. The electric lighting plant, which will include two of the General Electric Co.'s marine sets, with 5 by 4-inch double cylinder General Electric Co. engine, will be an important item of expense in each of these vessels.

About the only important item of freight in which there was a decrease during the past season was hard coal, which is moved principally from Buffalo to the northwest. Shipments from Buffalo during 1896 aggregated 2,400,068 net tons, according to custom house reports. This is a decline of 220,700 tons, compared with last year's shipments. Shipments from Buffalo by lake for the years named were as follows: 1896, 2,400,068 tons; 1895, 2,620,768 tons; 1894,



SIDE ELEVATION PLAN OF NEW LIGHT-SHIPS.

cient power to move them to and from their stations. One of them will be located on Diamond shoals, Cape Hatteras; another at Fire Island, N. Y., and the third at San Francisco bar. Bids will be received on all of the vessels to be delivered on the Atlantic coast, but an alternate proposal may be submitted for one of them to be delivered at San Francisco. Dimensions are: Length between perpendiculars, 112 feet; breadth, molded, 28 feet 6 inches; depth of hold from top of keel to top of spar deck beam, 22 feet 1 1/2 inches. The frame is to

2,485,255 tons; 1893, 2,703,673 tons; 1892, 2,852,330 tons; 1891, 2,365,890 tons; 1890, 2,157,810 tons.

Grant Grummond of Detroit, who operated the passenger steamer State of Michigan during the past season between Cleveland and Detroit in competition with the Detroit & Cleveland Steam Navigation Company, is endeavoring to enlist capital in the construction of two new steamers for this service.



DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio,
by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient
binders sent, post paid, \$1.00. Advertising rates on application.

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The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

| | Number. | Gross Tonnage. |
|---------------------------------|---------|----------------|
| Steam vessels..... | 1,792 | 924,630.51 |
| Sailing vessels and barges..... | 1,125 | 354,327.60 |
| Canal boats..... | 416 | 45,109.47 |
| Total..... | 3,333 | 1,324,067.58 |

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

| Year ending June 30. | 1891 | 1892 | 1893 | 1894 | 1895 | 1896 | Total |
|----------------------|------------|-----------|-----------|-----------|-----------|------------|------------|
| No. vessels..... | 204 | 169 | 175 | 106 | 93 | 117 | 864 |
| Gross tonnage..... | 111,856.45 | 45,968.98 | 99,271.24 | 41,984.61 | 36,352.70 | 108,782.38 | 444,216.36 |

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC. (From Official Reports of Canal Officers.)

| | St. Mary's Falls Canal. | | | Suez Canal. | | |
|------------------------------|-------------------------|------------|-----------|-------------|-----------|-----------|
| | 1895* | 1894 | 1893 | 1895 | 1894 | 1893 |
| No. vessel passages..... | 17,956 | 14,491 | 11,008 | 3,434 | 3,352 | 3,341 |
| Tonnage, net registered..... | 16,806,781 | 13,110,366 | 9,849,754 | 8,448,383 | 8,039,175 | 7,659,068 |
| Days of navigation..... | 231 | 234 | 219 | 365 | 365 | 365 |

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about 1/4 per cent. of the whole, but largely in American vessels.

In the December number of the Journal of Political Economy, published by the University of Chicago, Geo. G. Tunell presents a valuable collection of facts regarding lake transportation and the iron industry. Mr. Tunell's article is based on the enormous amount of iron ore that is annually transported on the lakes, and he concludes with the statement that if the ton-mile rate on the lakes, instead of being less than a mill, were three mills, which is regarded as quite exceptionally low on the railroads, the freight charge for transporting ore from Duluth to Cleveland would be \$2.54—a rate higher than the traffic could bear. The writer might have added that it would never have been possible to develop the great ore mines of the Lake Superior region but for the low cost of transportation by lake. One paragraph in Mr. Tunell's article is so arranged as to show the importance of the ore traffic developed by low freight rates. He says: "From a comparatively important position the Lake Superior region has, in the course of a decade and a half, come to contribute almost twice as much ore as all the other parts of the United States combined. In the census year 1880 the total production for the United States was 7,120,362 long tons; to this amount the lake region contributed but 1,677,814 tons, or 23.6 per cent. of the total output. During the year 1895 15,957,614 long tons of ore were mined in the United States and of this amount 10,328,248 tons or 64.7 per cent. were taken from the mines of the lake region. The bare figures without further explanations do not, however, fully reflect the importance of the northern district, for Lake Superior ores are very much richer in iron than the ores of the other regions. If the quality as well as the quantity of the ore be taken into consideration the lake region is entitled to even a more important position than would be assigned to it on a simple tonnage basis of comparison."

The daily newspapers seem to be disturbed about a Holland submarine torpedo boat which Louis Nixon of Elizabethport, N. J., is said to be building "under cover" for either the Spaniards or the Cubans. It is not probable, however, that the Holland type of boat (or any other submarine vessel for that matter) has as yet been far enough advanced in the experimental stage to warrant either of the Cuban parties in wasting any money on it. In June last congress authorized the construction of two sub-marine torpedo boats of the Holland type, at a cost not exceeding \$175,000 each, provided that the Holland boat now being built for the government should be accepted by the navy department as fulfilling all the requirements of the contract and as

being satisfactory to the secretary of the navy. The act further provided that no action regarding the additional Holland boats should be taken until the boat now under construction should have been fully tested to the satisfaction of the secretary of the navy and accepted. The boat referred to as under construction is being built by the John P. Holland Torpedo Boat Co., who have placed their work with the Columbian Iron Works of Baltimore as subcontractors. But the latest reports from the navy department do not recommend the expenditure of the additional appropriation. Chief-Constructor Hichborn, in his latest report, says that the condition of the work upon the boat now being built is such that some time must elapse before the tests can be completed, and pending such tests his bureau reserves its recommendations.

Every time a timber dry dock is built in this country some one of the English shipping journals is certain to refer to it as an undertaking of the "penny-wise and pound-foolish" kind. The 600-foot Port Orchard dock on Puget sound, recently completed by the government, is thus spoken of. These critics do not take into account the cheapness of timber in this country as against stone, especially in the Puget sound district. The Port Orchard dock cost about \$650,000. Such a dock made of stone, even in England, would cost full \$3,500,000. The heavy cost of repairs and the short life of timber docks are, of course, big items, but conditions attending first cost will cause them to be built in this country for a long time to come. Nobody has as yet given consideration to the construction of a stone dock on the lakes, and it is not probable that any thought will be given to the subject until the price of timber is materially advanced and there are indications of a limit being reached in the size of vessels.

We may be pardoned for considerable boasting about ship building on the lakes on account of the progress that has been made in a few years, but we are forcibly reminded of the insignificance of this industry here with each succeeding report on the annual output of British yards. During the year just closing, Harland & Wolff, famous Belfast builders, have turned out eleven vessels of 81,316 gross tons and of 61,324 horse power. The average is 7,304 gross tons and 4,484 horse power. In addition to this, these builders added 971 tons to one steamer by lengthening her and put new engines of 12,000 horse power into another steamer. Eight of the eleven vessels were twin-screw steamers, and three of them were fitted with quadruple engines. One was of 13,700 tons and three others were above 8,000 tons.

Chicago's enterprise whenever there is anything pertaining commercial advantages in sight is certainly to be commended. Following up the refusal of United States Engineer Marshall to expend government appropriations for purposes other than dredging in the river, a delegation of Illinois congressmen has appealed to the secretary of war, and if possible the money will not only be used for widening and straightening the river, all of which should be done by the city, but a part of it may be applied to lowering some of the obstructing tunnels.

For some time past nothing has been heard of the two deep waterway commissions appointed by Canada and the United States, but it is now said that a report to the president will be submitted by the United States commission before the new year. There is considerable doubt in the minds of most people on the lakes as to whether these commissioners can ever do anything more than collect, in a single report, a large amount of data, more or less speculative, on the subject of a deep-water outlet from the lakes to the seaboard.

The Detroit river bridge question is again laid aside. The senate committee in commerce has decided positively that there will be no further agitation of the subject in the present congress. If it were not for the influence of the Lake Carriers' Association a bridge with all manner of piers would now span the river at Detroit and the Michigan Central Railway would be in possession of another important link in its monopoly.

Stern and stem pieces in the revenue cutter building at the ship yard of the Cramps, Philadelphia, for the Pacific coast are of manganese bronze. The stem piece is a solid casting, weighing 17,000 pounds, and is the largest ever run out in that metal in the United States. It was cast at the Cramp brass foundry.

The New Revenue Cutters.

There is every reason to believe that statements made by Chief Engineer J. W. Collins and other officers of the revenue cutter service regarding the speed of the revenue cutter Gresham are correct, and it can therefore be said that, having attained during a short spurt a speed of 18.25 knots, or 21.01 statute miles, she is not only the finest vessel now in the service, but is among the fastest ships on the lakes, not excepting the North West and North Land. The Gresham will not, however, retain for any great length of time the honor of being the finest of United States revenue cutters, as a vessel somewhat more costly is being built by the Cramps for the Pacific coast station, and contracts will be let in Washington shortly for two more cutters for the lakes that are to be fully equal to the boat just completed in Cleveland.

Mr. Collins with several other officers of the revenue cutter bureau took the Gresham from her builders, the Globe Iron Works Co. of Cleveland, on Saturday, for an official trial. Assistant Secretary Ireland and Assistant General Manager Newman of the Globe company, together with Mayor McKisson, ex-Mayor Gardner and a few other prominent citizens, were aboard on the trip. The engineer force was sufficient to carry on a trial along lines followed by the navy, but not, of course, quite so elaborate as the trials of big war ships. The speed required in the specifications was 16 knots with the engines developing 2,000 horse power. Mr. Collins said after the trial:

"During the first two hours and a half the vessel made a speed of 17 knots or 19.6 statute miles; the main engine making an average for this entire run of 160 revolutions per minute. Had it not been for a plate which was carelessly left off one of the air ducts a higher rate of speed would have been obtained. Under natural draft and with only 120 pounds of steam, the throttle being but two-tenths open, an average speed of 14½ knots or 17½ statute miles was maintained, the main engine making 140 revolutions per minute. The last hour of the trial was under maximum conditions. The steam pressure averaged 155 pounds, the average revolutions was 167, and the speed for the hour was 17.53 knots, or 20.16 statute miles. The maximum speed during ten minutes of this run was 18.25 knots, or 21.01 miles, when the engine made 171 revolutions. The speed as calculated from the revolutions of the engine was 20.9 knots; this would make the slip of the propeller only about 13 per cent., which I consider to be a remarkably good performance. I have carefully calculated the maximum power, by means of a planimeter, and find that the main engine developed 2,523.2 horse power. The air, circulating, and feed pumps, and blowing engines, developed 127.6 horse power, thus making a total indicated horse power for the main engine and its auxiliaries of 2,650.8. The average total horse power for the last hour was 2,593. I designed the engine to develop only 2,000 horse power, and am highly gratified with the results obtained. Under the old system of premiums for increased power on government vessels the Globe company would have received a bonus amounting to about one-third the contract price of the vessel."

The Gresham is of open-hearth steel throughout, and is 205 feet long over all, 188 feet on the water line, 32 feet beam and at a mean draft of 10 feet 6 inches will displace about 900 tons. She has two pole masts and a small spread of fore and aft sails to steady her. She has a steam windlass, steam steering engine, steam heating apparatus and an electric light plant of 135 fixed lights together with a powerful search light. She will carry five boats in all, including a 28-foot steam launch. Her only armament at present is one six-pounder, rapid firing Drigg-Schroeder rifle, but she is capable of carrying a much heavier armament when necessary. The stem is fitted with a 15-inch torpedo tube, located about 6 feet above the water line.

Propelling engines are of the vertical inverted, direct acting, triple expansion type, having cylinders 25, 37½ and 56½ inches in diameter respectively, with a common stroke of 30 inches. The shafting, piston and connecting rods and the front columns are of the finest forged steel obtainable, and were made by the well-known Bethlehem Iron Co. Steam is supplied by four Scotch boilers, each 11 feet 6 inches in diameter by 10 feet long. Each boiler has two corrugated Fox furnaces, 42 inches in diameter, and the total grate surface is 186 square feet. One of the features of the steam machinery is that it can be used for either fresh or salt water, the vessel being fitted with a surface condenser, distilling apparatus, etc.

The Review has excellent photographs of lake ships.

Big Orders for Artificial Draft.

Whatever may be said of the enthusiasm that has been stirred up over the successful operation of water tube boilers in the latest of the big British cruisers, it would seem that the manufacturers of artificial draft apparatus have no cause for complaint in the number of orders they are getting. A letter to the Dry Dock Engine Works of Detroit from James Howden, the Scotch inventor of the Howden hot draft, reports that during the month of November he booked orders for the draft to go into twenty-six new steamers, while the number of installations during the year was 120, applied to 357,900 horse power, chiefly in large steamers and not including those of this country. This makes a total in all parts of the world to Nov. 30, 1896, of 1,383,500 horse power to which the Howden system has been applied.

The Peninsular & Oriental Steam Navigation Co., which is the greatest steamship line in the world, having a fleet of vessels aggregating 300,000 tons, seems to have unlimited faith in the Howden draft. In a description of the India, the latest and largest big liner built for this company, and which has six cylindrical boilers, each of 14 feet 10 inches diameter, the Engineer of London says: "The boilers are fitted with Howden's patent system of draft, a principle of accelerating the combustion in furnaces already too well known to need description. Incidentally it may be stated that the Peninsular & Oriental company tried the Howden draft for the first time four years ago. Today it has, including the India, China, Egypt, Arabia, and others under construction, seventeen steamers fitted with this system. Nothing special distinguishes the system on board the India from that already in use on board other important vessels of the fleet. The air for combustion is supplied by three blast fans. These fans are cased, 8 feet in diameter, and each is coupled direct to a compound single-crank single acting engine, which drives the fans at a speed of about 250 revolutions per minute. The three fans are collectively capable of delivering about 150,000 cubic feet of air per minute, the air being drawn in at the top and discharged at the bottom to the passages conducting to the air heaters and reservoir on the boiler fronts."

The Dry Dock Engine Works has closed a contract with Capt. Norton of Marine City to compound the steamer Kate Buttironi, and to build for her a new cylindrical boiler equipped with Howden draft apparatus.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Dec. 12, 1896:

| | Wheat, bushels. | Corn, bushels. |
|-----------------|-----------------|----------------|
| Chicago | 1,497,000 | 4,836,000 |
| Duluth | 2,077,000 | 4,000 |
| Milwaukee | 348,000 | 3,000 |
| Detroit | 404,000 | 57,000 |
| Toledo | 1,123,000 | 229,000 |
| Buffalo | 2,808,000 | 461,000 |
| | 20,257,000 | 5,590,000 |

As compared with a week ago, the above figures show, at the several points named, a decrease of 607,000 bushels of wheat and an increase of 116,000 bushels of corn.

An apparatus for night signalling by means of electric light which would seem to be capable of very wide application at sea and on shore is known as the Crandall electric signal. It consists of a number of incandescent lamps arranged on a frame in the form of a monogram. This monogram contains the elements of all the letters in the alphabet, each of which may be shown in turn by completing the electric circuit in which they are arranged. This frame being hoisted to the mast-head so that the letters when exhibited may be visible abeam, or ahead, as may be desired, the wires are led down to the deck and there connected with an instrument resembling a typewriter. The operator by touching any particular key sets the lamps which form that letter on the frame aglow, and any signal may be spelled out and read off from a distance.

A photograph of the largest boat on the lakes, the Sir Henry Bessemer, will cost you only \$1.50. Write the Marine Review.

Holiday excursion tickets are on sale via the Nickel Plate road on Dec. 24, 25, 31, and Jan. 1, 1897. Return limit Jan. 4. 409 Dec. 31

Ship Yard Matters.

Dry dock work in Cleveland, especially on the steel vessels, many of which are undergoing repairs that were put off until the close of navigation, seems to be even more active than during previous winters. The Henry Cort, one of the Bessemer company's vessels, was in the Cleveland dry dock last week and was followed by the steamer Republic, which is now in dock. The big dock of the Ship Owners' company now contains the steel whaleback steamer Pathfinder, which will be followed by the steamers Pioneer and Queen City and the steel barge John Scott Russell. The rebuilding of the wrecked wooden steamer Wallula of the Wilson line, which will involve an expenditure of probably more than \$20,000, will also prove an important job in Cleveland.

At Marine City Alex. Anderson is rebuilding the barge George Nestor, which was built at Baraga, Mich. She will be given steel arches. M. P. Lester is finishing up the extensive rebuild of the Mark Hopkins, which was sunk in Hay lake by the steamer Vanderbilt in 1895. The Hopkins will come out next spring fitted with steam auxiliary machinery of all kinds, making her a modern single-decker.

Tonnage of the big steel car ferry Pere Marquette, which is now about ready to leave the ship yard of F.W. Wheeler & Co., West Bay City, is 5,580.28 gross and 4,133.83 net. As with other vessels at Wheeler's yard machinery of the car ferry has all been placed with the vessel on the stocks, so that it is expected she will be in regular service between Ludington and Manitowoc on Lake Michigan, during the present month.

The Detroit Dry Dock Co. will make extensive repairs during the winter on the wooden steamer A. Folsom and schooner Mary B. Mitchell.

Arc Lamps For Marine Use.

The discovery that the two carbons of an arc lamp, when burned in a closed receiver and immersed in an inert gas, were consumed

more slowly than similar carbons carrying the arc in the open air, combined with the fact that they might be operated with nearly double the voltage of ordinary arcs, with corresponding decrease in the current, has given a great impetus to the arc lamp industry. These discoveries resulted in the design of an arc lamp which requires trimming every 50, 100 or 150 hours, according to its construction and requirements. The reduction in the number of trimming intervals involves not only an economy in labor, but also does away with the annoyance which the daily visit of the trimmer usually entailed. The economy in carbons and current consumption is also such that the adoption of the long-burning lamp has come to mean a reduction of expenses all around.

The long-burning arc lamp for ordinary incandescent circuits manufactured by the General Electric Co. is peculiarly simple in construction, the mechanism consisting of little more than an electro magnet and a friction clutch. The arc is entirely enclosed in an inner globe, which in turn is surrounded by an outer globe. The nature of the light is, of course, dependent upon different combinations of the two globes. For marine work on deck or in the hold the standard



long-burning arc lamp has been modified to the extent of shortening it and constructing it to burn fifty hours without retrimming. The outer globe is of clear glass, cylindrical instead of spherical, and is protected by a heavy wire guard.

On and after Monday, Dec. 14, accommodation trains Nos. 18, 19, 20 and 21 between Cleveland and Lorain, via the Nickel Plate road, will be discontinued.
413 Dec. 17

Around the Lakes.

Two new steel barges building at Cleveland and Chicago for James Corrigan will very probably tow with the steamers Italia and Bulgaria.

The owner of the schooner D. S. Austin is unable to pay a wrecking and repair bill amounting to \$1,200 and the vessel will be sold. She is at Sturgeon Bay.

Francis B. Clarke has been appointed traffic manager of the Great Northern Railway. The name of his successor in the Northern Steamship Co. has not as yet been announced.

Employees of the Cleveland Tug Co. manifested their regard for the manager of the line, Chancy Morgan, by presenting him with a costly set of opera glasses at the close of the season.

Major Clinton B. Sears, United States engineer at Duluth, announces in an advertisement elsewhere in this issue that proposals for building a breakwater at Presque Isle point near Marquette will be opened on Jan. 11.

M. E. B. A. No. 2 of Cleveland held the first meeting of the winter Thursday evening to nominate officers, to be elected the following week. A number of lectures on marine engineering will be given during the winter.

The management of the Bessemer Steamship Co. is in receipt of a telegram from representatives of English underwriters congratulating them on the very small claim for damages sustained by their boats during the past season. The loss is hardly worth mentioning.

Friends of Capt. George J. Bennett of Port Huron, who is a full-fledged specimen of the big-hearted vessel master, are congratulating him upon progress in Masonic honors. He has been advanced to the thirty-second degree in a little over two years.

Capt. John C. Symes, who was best known as master of the Cleveland steamer Cadillac, died at his home in Sarnia, Ont., Monday. He had been in poor health for some time past. Capt. Symes belonged to a family of lake navigators. He was among the most capable young men in charge of lake steamers.

Another company is being organized among Cleveland coal shippers for the erection of a car dumping machine. The plant, which will be the fourth of its kind in Cleveland, will cost about \$25,000 and will be used for the transfer of coal that comes into Cleveland over the Baltimore & Ohio Railway system.

When the F. & P. M. car ferry Pere Marquette begins running between Manitowoc and Ludington on Lake Michigan, the connection will make the shortest possible line of transportation from St. Paul, Minneapolis and Duluth to the Atlantic seaboard. On the west side of the lake connection will be made direct with the Chicago & Northwestern and Wisconsin Central railways.

Hughes Bros. & Bangs, who were supposed to have secured the \$2,000,000 breakwater job at Buffalo, are meeting with opposition from representatives of the National Construction Co. of New York, who are charging informalities in bonds. The matter has been taken to Washington but will probably be settled by a ruling of the secretary of war before the close of the week.

B. F. Perkins, grand secretary of the American Association of Masters and Pilots, is again on the lakes establishing branches of this organization, which bids fair, on account of its benevolent features, to eventually take in nearly all of the captains and masters on the lakes. Capt. Collier and other leading officers of the Ship Masters' Association are giving hearty support to the movement.

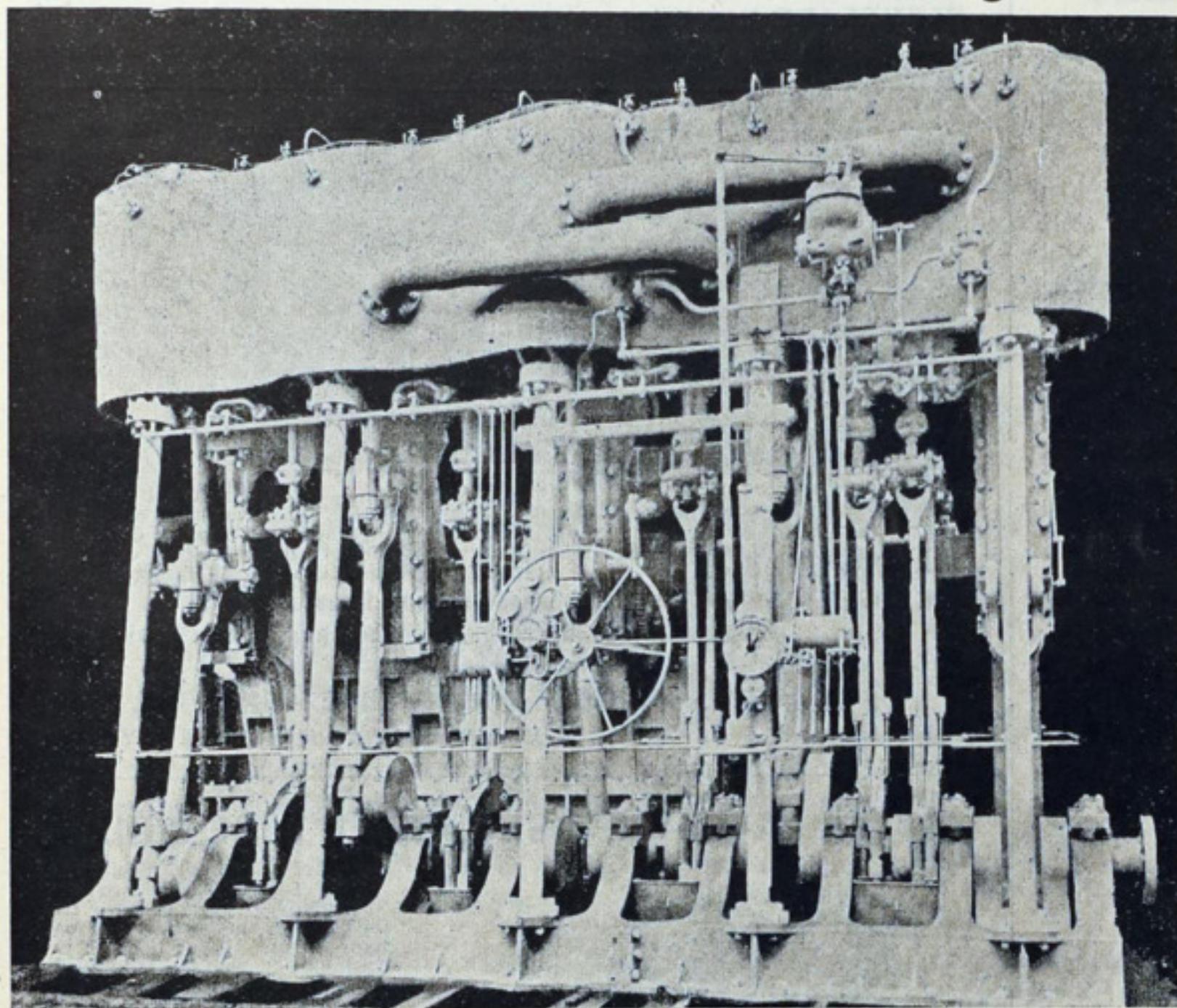
Another congressman, Mr. W. A. Smith of Michigan, is about to investigate the memorandum treaty between this country and Great Britain, which deprives lake ship builders of the right to build vessels of war. He is proceeding in the right way, as he has just introduced a resolution which aims at first securing from the secretary of the navy all information which led to his ruling not long ago against even the construction on the lakes of machinery for war vessels. In view of efforts made in the past to overcome this treaty stipulation, Mr. Smith's task is a difficult one, but he says he is determined to press the matter as far as it is possible to do so.

The Babcock & Wilcox Company of England is fitting in the torpedo gunboat Sheldrake four boilers having a total heating surface of 9,850 square feet. This vessel's engines are of 3,500 horse power.

A QUEER COINCIDENCE! THAT SERVE RIBBED TUBES AND ELLIS AND EAVES DRAFT

SHOULD BE IN THE BOILERS OF THE

Two Most Economical Cargo Steamers in the World!



ENGINES OF THE INCHMONA—

Hull, 325 feet long,
46½ " beam,
20½ " draft,

Engines, 17, 24, 34, 42 and 42 x 42 in. stroke.

THE BOILERS ARE FITTED WITH SERVE RIBBED TUBES AND THE ELLIS AND EAVES DRAFT.

This steamer carries 5,000 tons cargo, 9 knots an hour on a daily fuel consumption of 11½ tons coal. This amounts to 1.07 lbs. of coal per horse power per hour, over ½ pound less than the best showing made by any lake steamer with any kind of draft, and the lowest ever obtained in marine practice.

ENGINES OF THE KENSINGTON—
(AMERICAN LINE.)

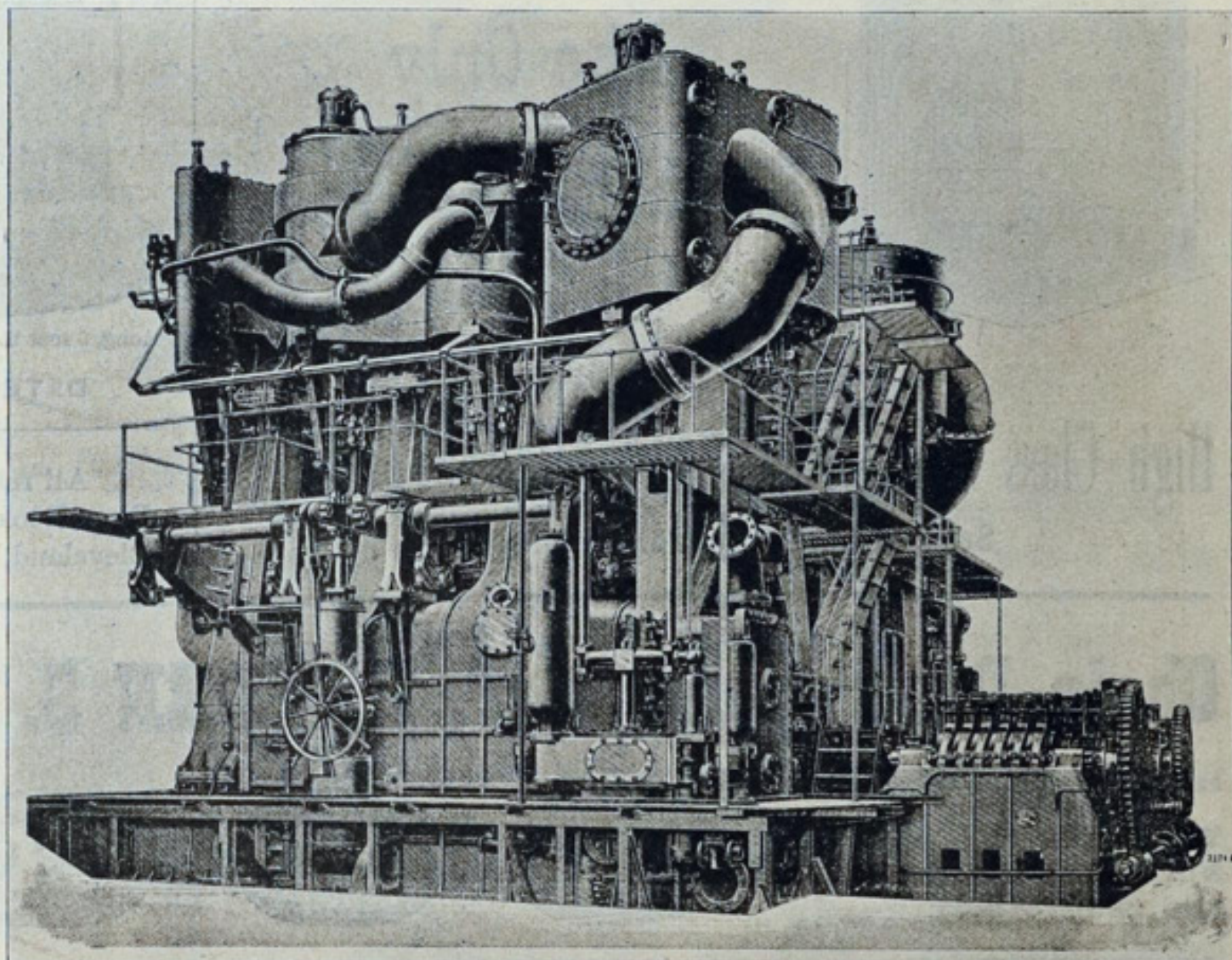
Hull, 480 feet long,
57 " beam,
40 " deep.

Twin Engines, 25½, 37½, 52½ and 74 x 54 in. stroke.

Boilers, Two Double-ended,
15 ft. 9 in. by 21 ft. 5 in.
One Single-ended,
15 ft. 9 in. by 11 ft. 3 in.

FITTED WITH SERVE RIBBED TUBES AND THE ELLIS AND EAVES DRAFT.

Coal consumption per I. H. P. per hour on this steamer is 1.4 lbs. This is ¾ lb. less than the average lake steamer. Her cargo capacity is 10,600 tons.



Serve Ribbed Tubes and the Ellis and Eaves Induced Draft are to be installed in at least two lake steamers during the coming winter,—and it can be guaranteed that these steamers will have a fuel consumption as low as 1½ lbs. per I. H. P. per hour. A result of 1¾ lbs. has been obtained with the Ellis and Eaves Draft and Plain Tubes in the L. C. Waldo.

Owners of steamers contemplating repairs to boilers during the coming winter can learn how they can save the cost of the repairs in one season, by writing to

THE GLOBE IRON WORKS COMPANY, CLEVELAND, OHIO.

J. S. DUNHAM,
President.CAPT. THOS. JOHNSON,
Chief Engineer & Wrecking Master.CAPT. J. R. SINCLAIR,
Superintendent.**DUNHAM TOWING & WRECKING CO.****15 TUGS AT CHICAGO,**
Chicago Telephone, No. 852 Main.**4 TUGS AT SO. CHICAGO,**
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Steamers when outside wanting our tugs, blow one long and one short blast of the whistle.

**TUGS, STEAM PUMPS, DIVERS, HAWSERS, LIFT-
ING SCREWS, LIGHTERS, Etc., for Releasing
Stranded or Raising Sunken Vessels,**

Furnished promptly on orders by telegraph or otherwise.

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ASSETS, 9,487,673.53

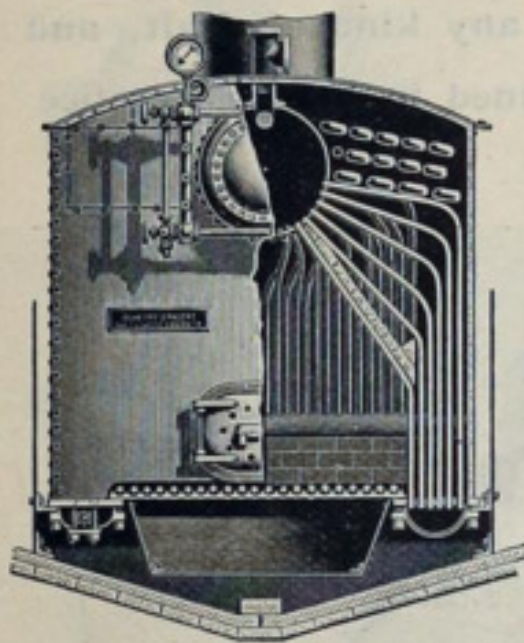
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**The Only
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Send 10 cent stamp for Catalogue.

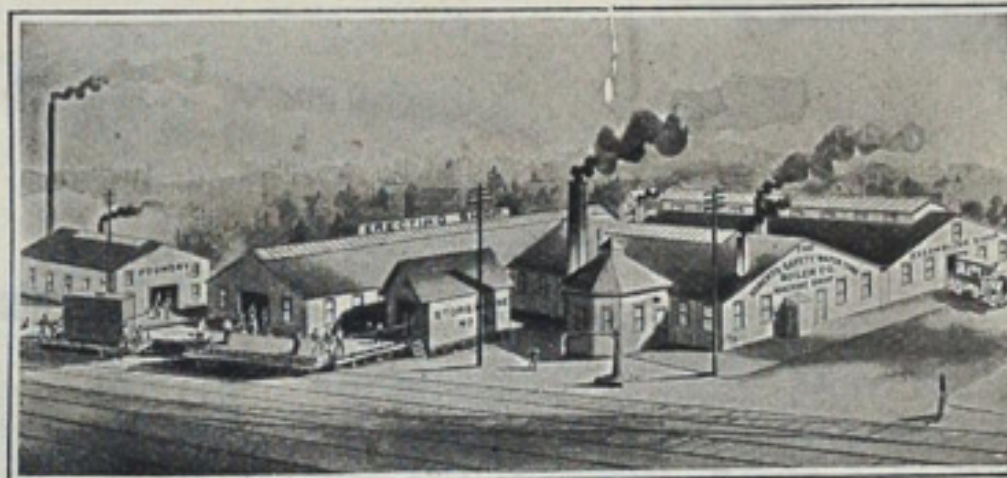
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DAVID BARNHISEL, Gen'l Mgr.**The Inter-Ocean Coal & Coke Co.**

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**Choicest Grades of YIOUGHIOGHENY COAL
FOR STEAMBOAT FUEL.**

Lighter in Cleveland Harbor of 400 tons capacity.

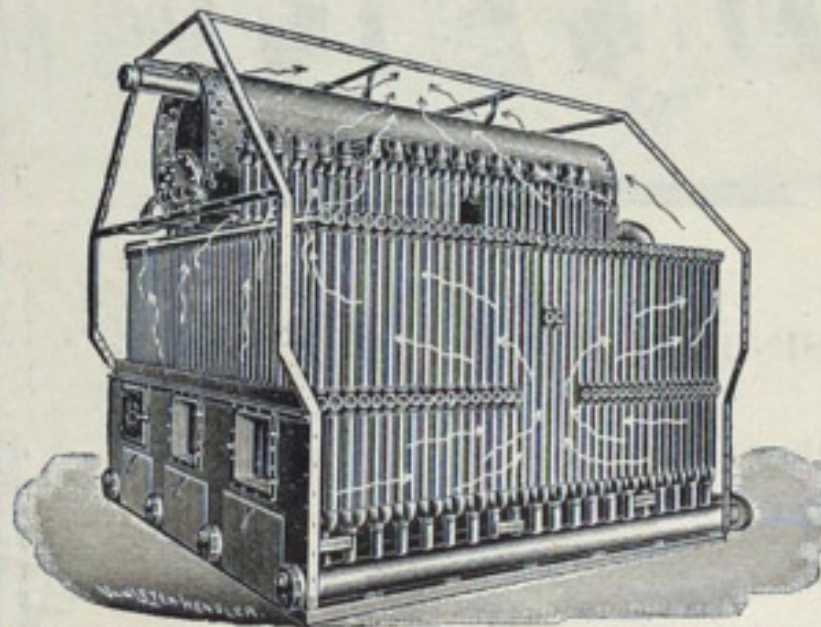
CLEVELAND DOCKS, just north of Main Street bridge.**SAULT RIVER DOCK, just above Detour, known as Watson dock**Office of
**AMERICAN
STEEL BARGE
CO.**West Superior
Wis.,
Oct. 31, 1895.The Roberts
Safety Water-
Tube Boiler Co.,
39 and 41 Cort-
landt St., New
York.Gentlemen:
Replying to
your of the
28th I am gladto say that the boiler you furnished us for tug "ISLAY" is giving entire satisfac-
tion. I have heard no complaint about it whatever, but have heard a good deal in its
favor. I ride on the boat frequently and must say that I am much pleased with its
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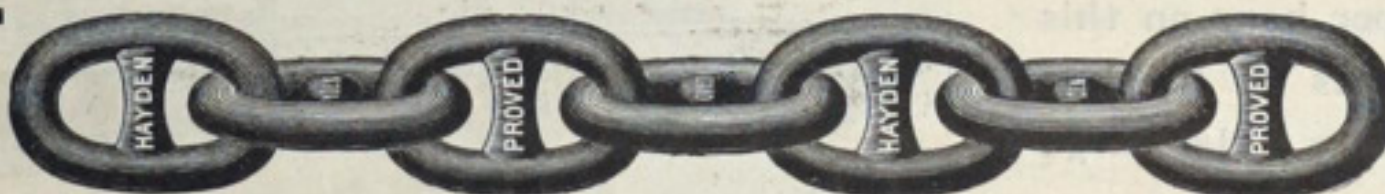
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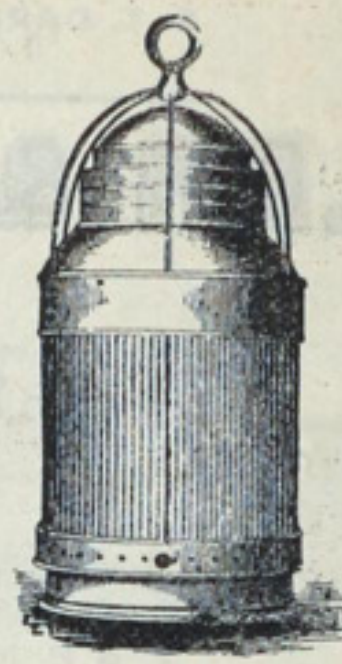


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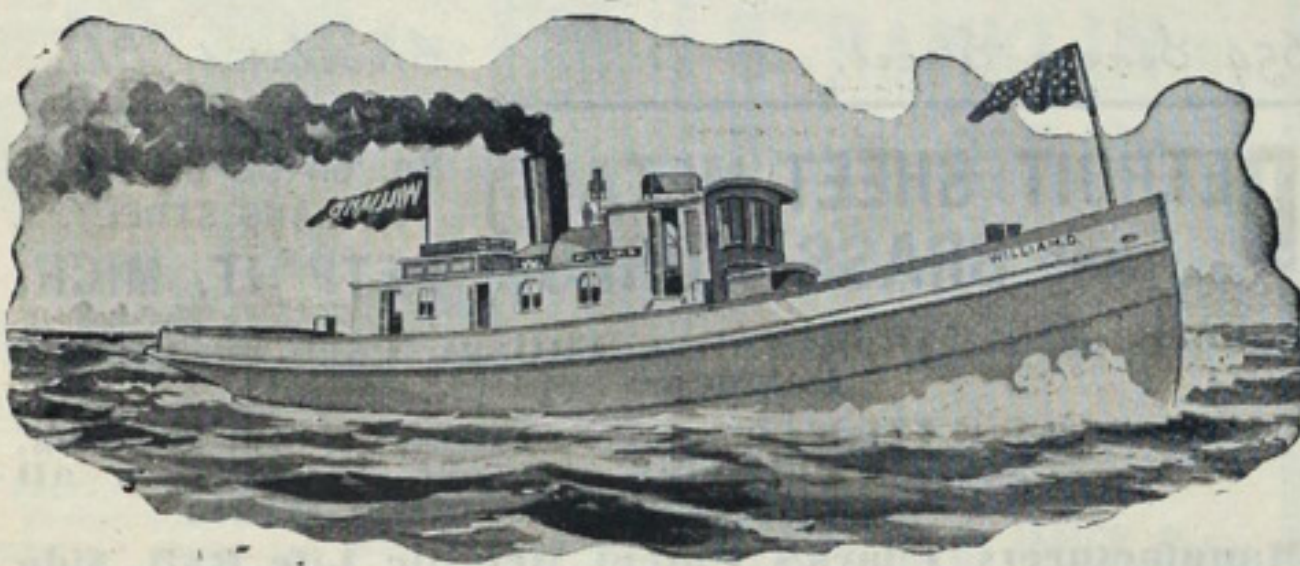
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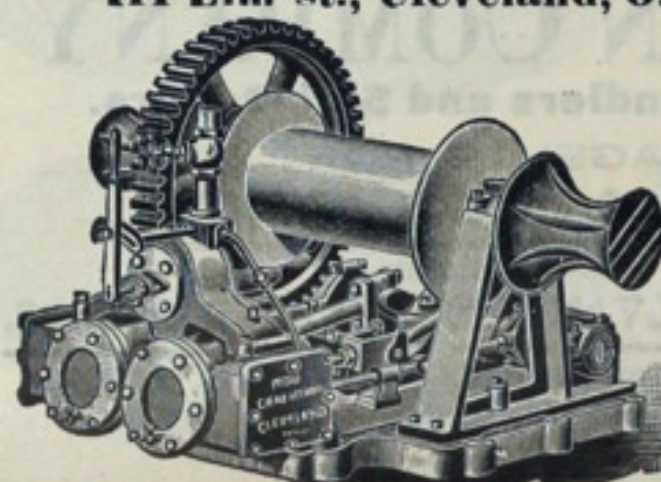
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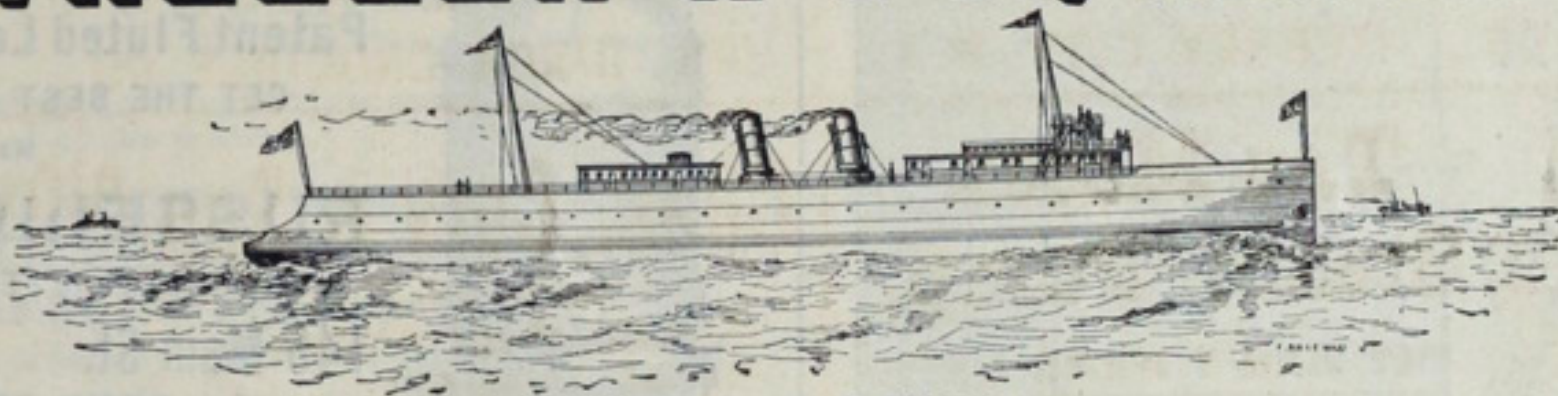
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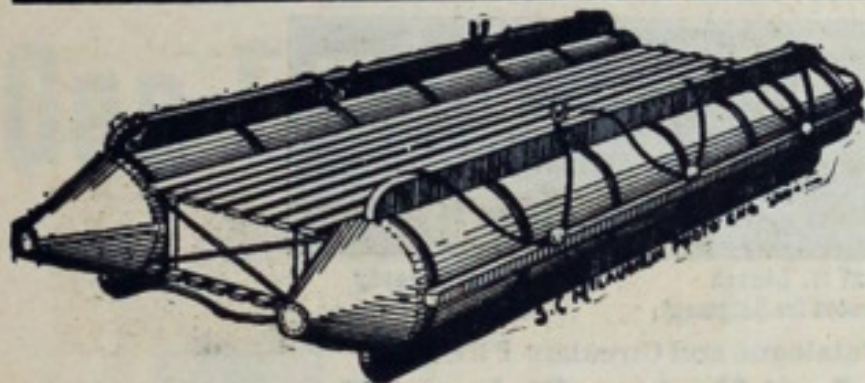
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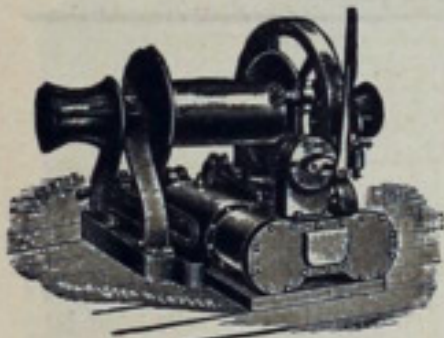
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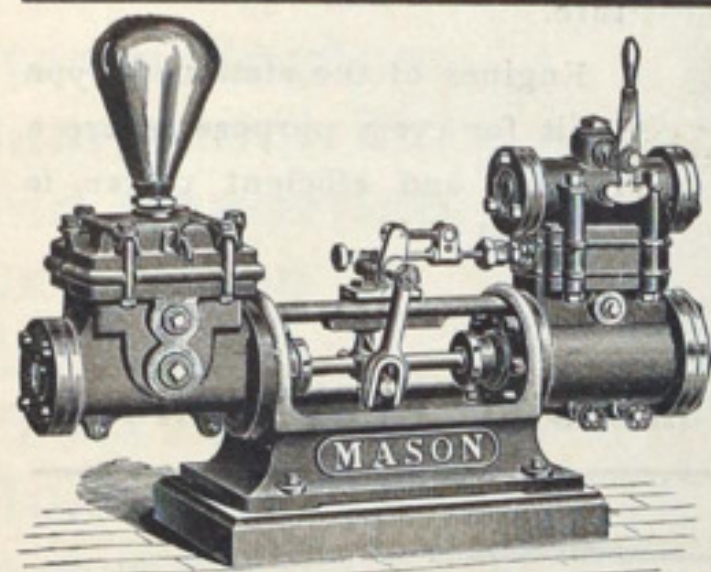
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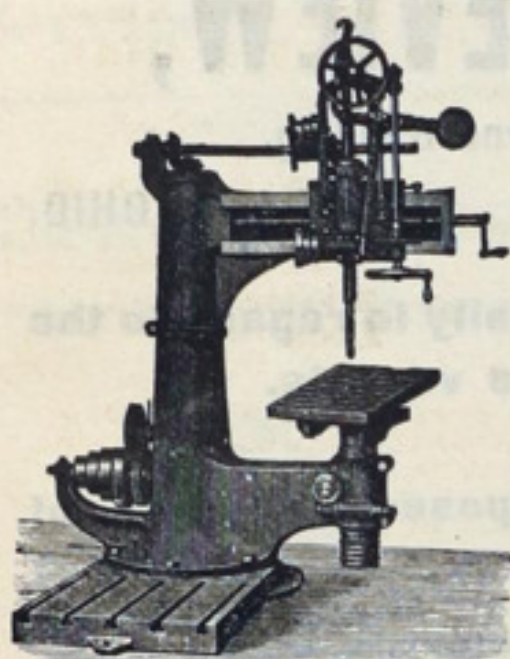
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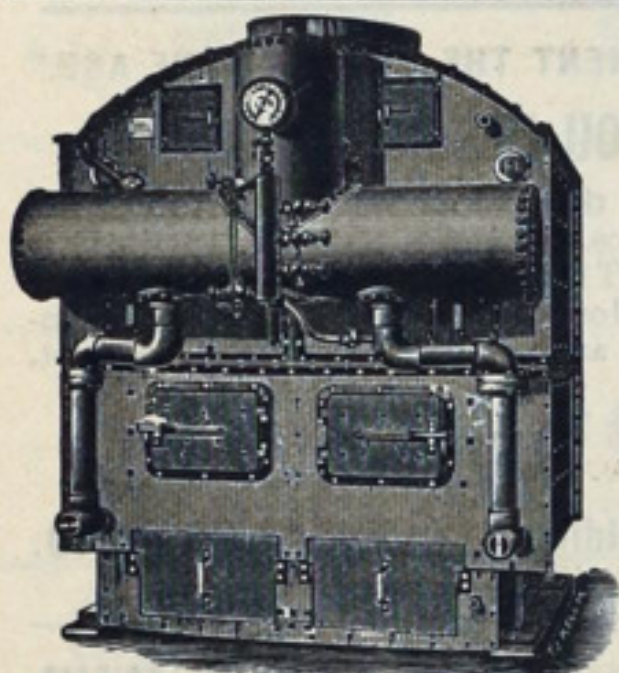
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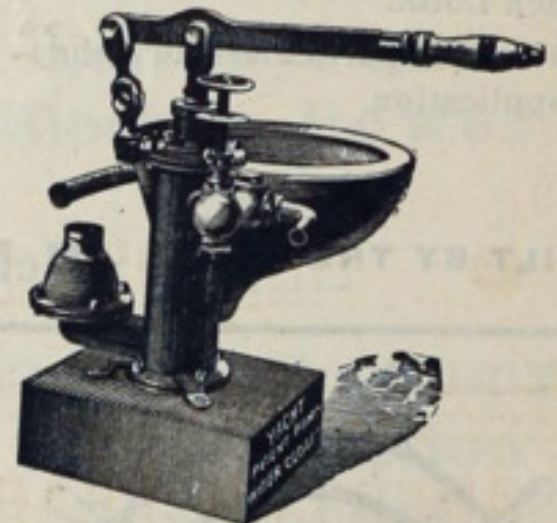
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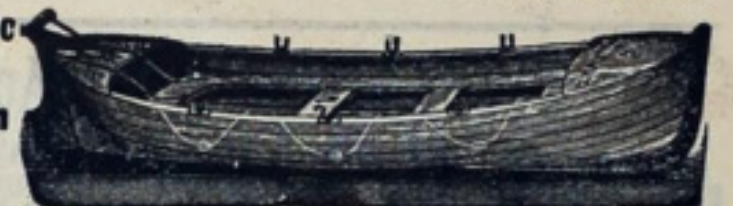
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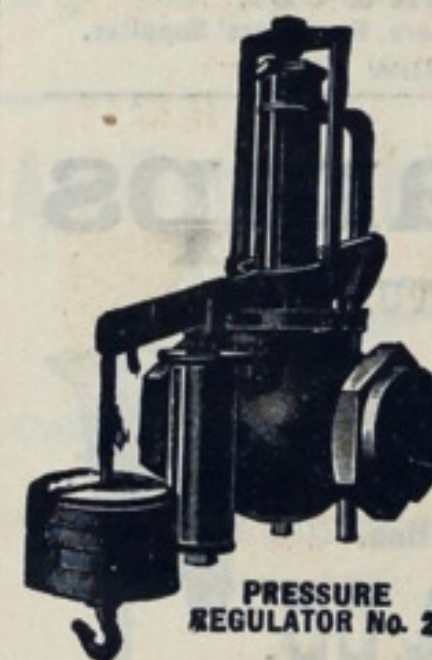
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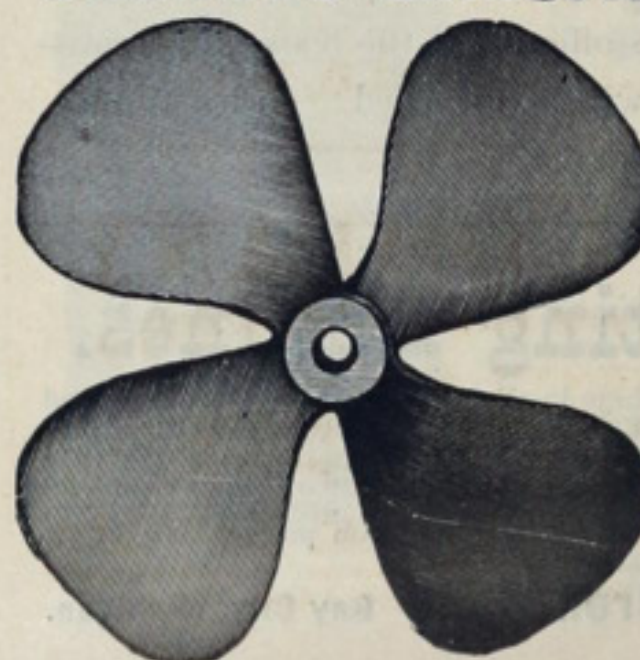
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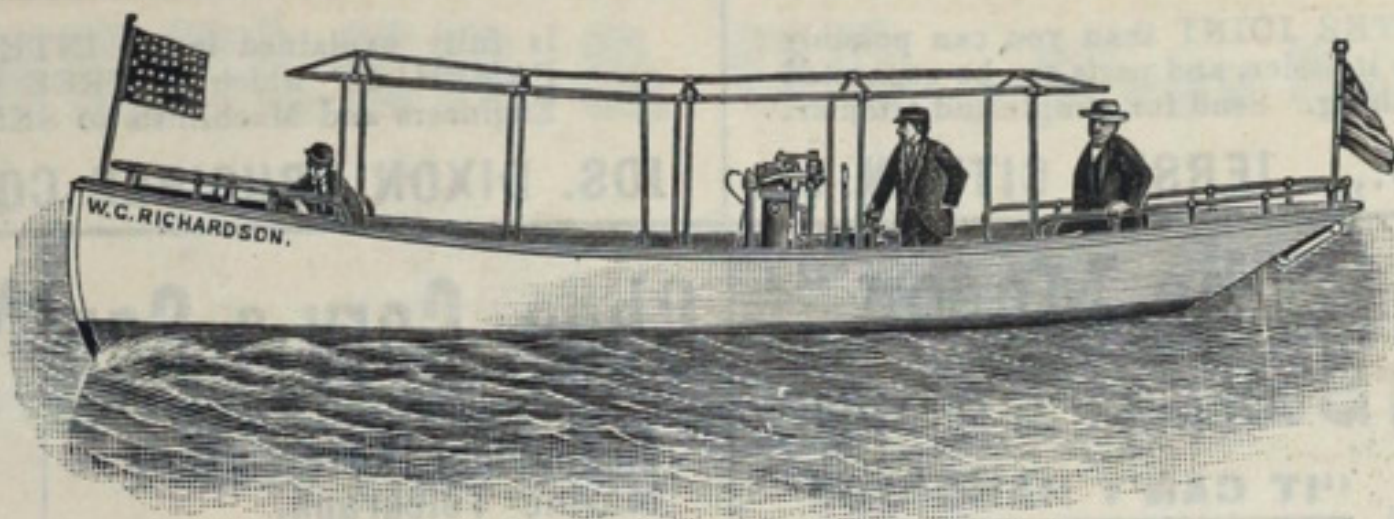
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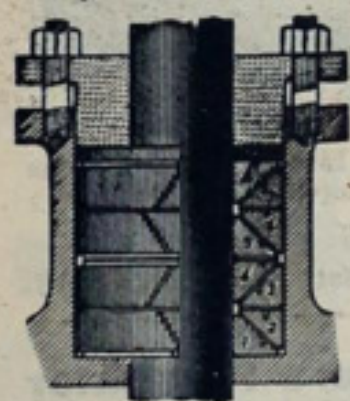
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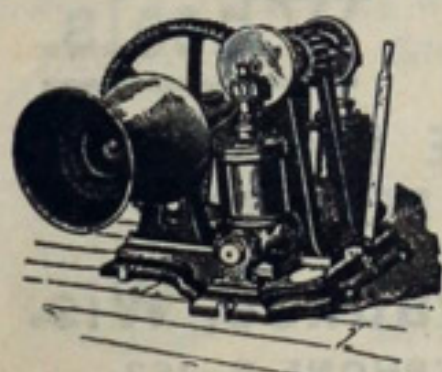
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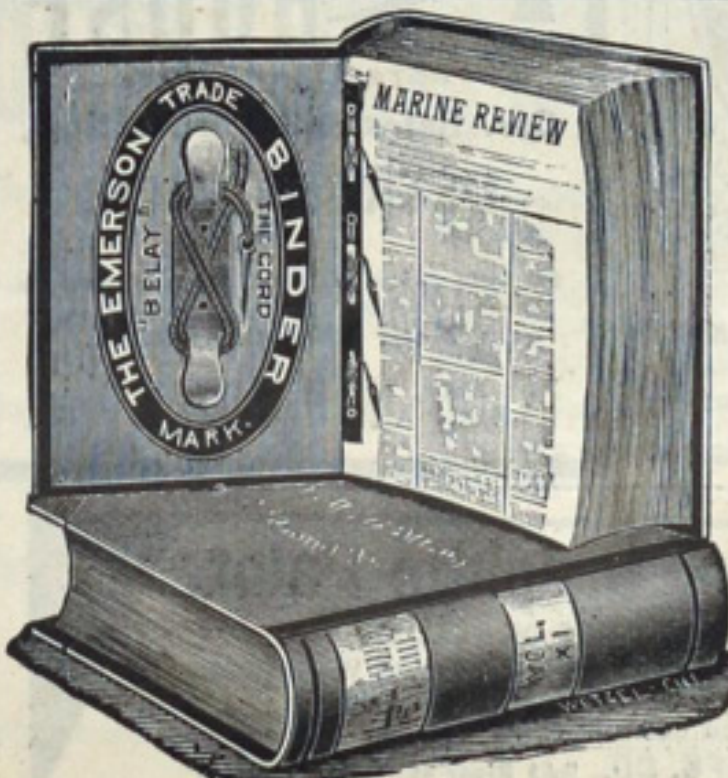
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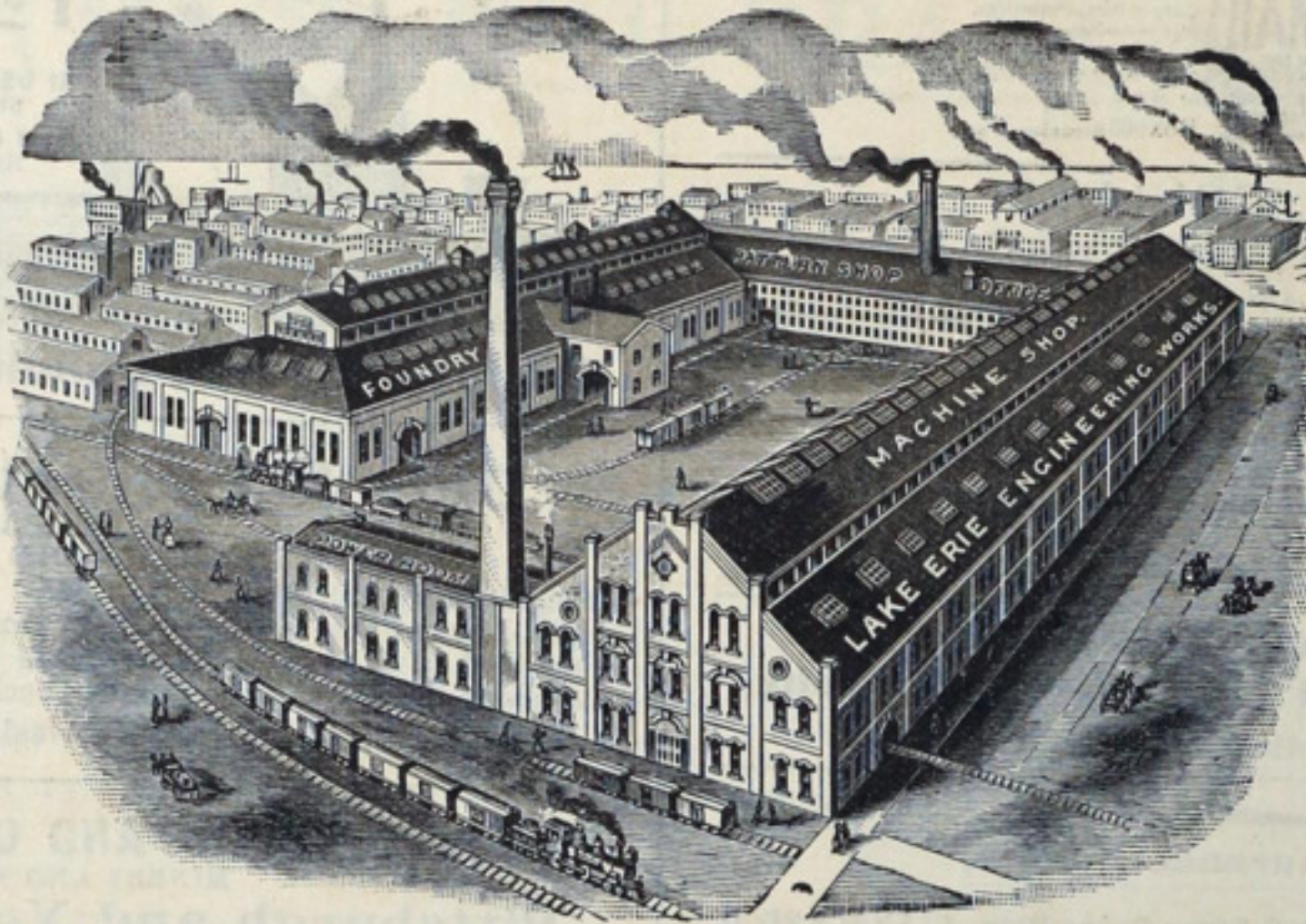
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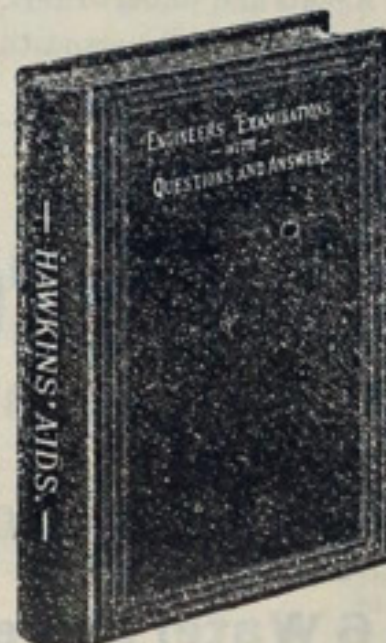
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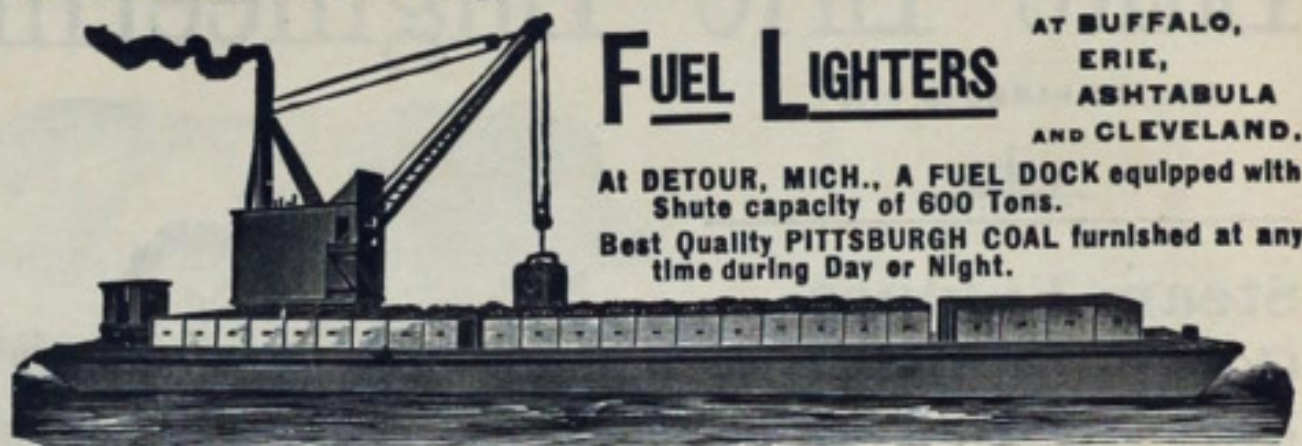
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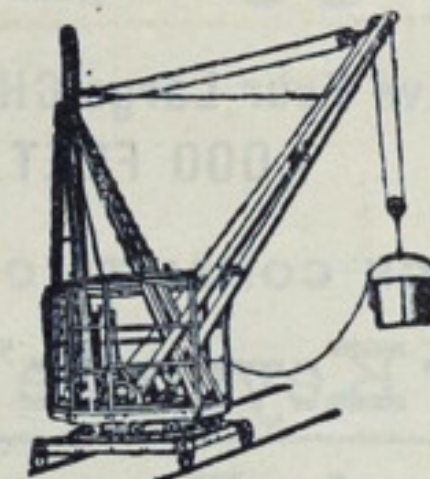
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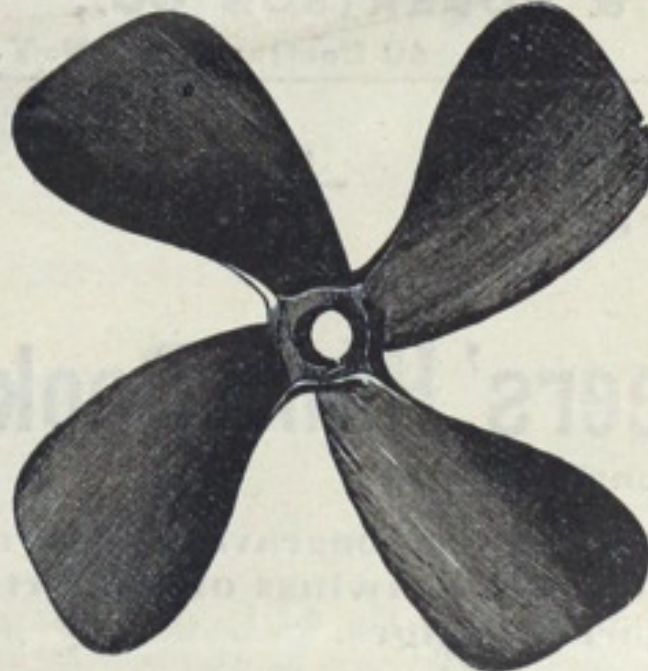


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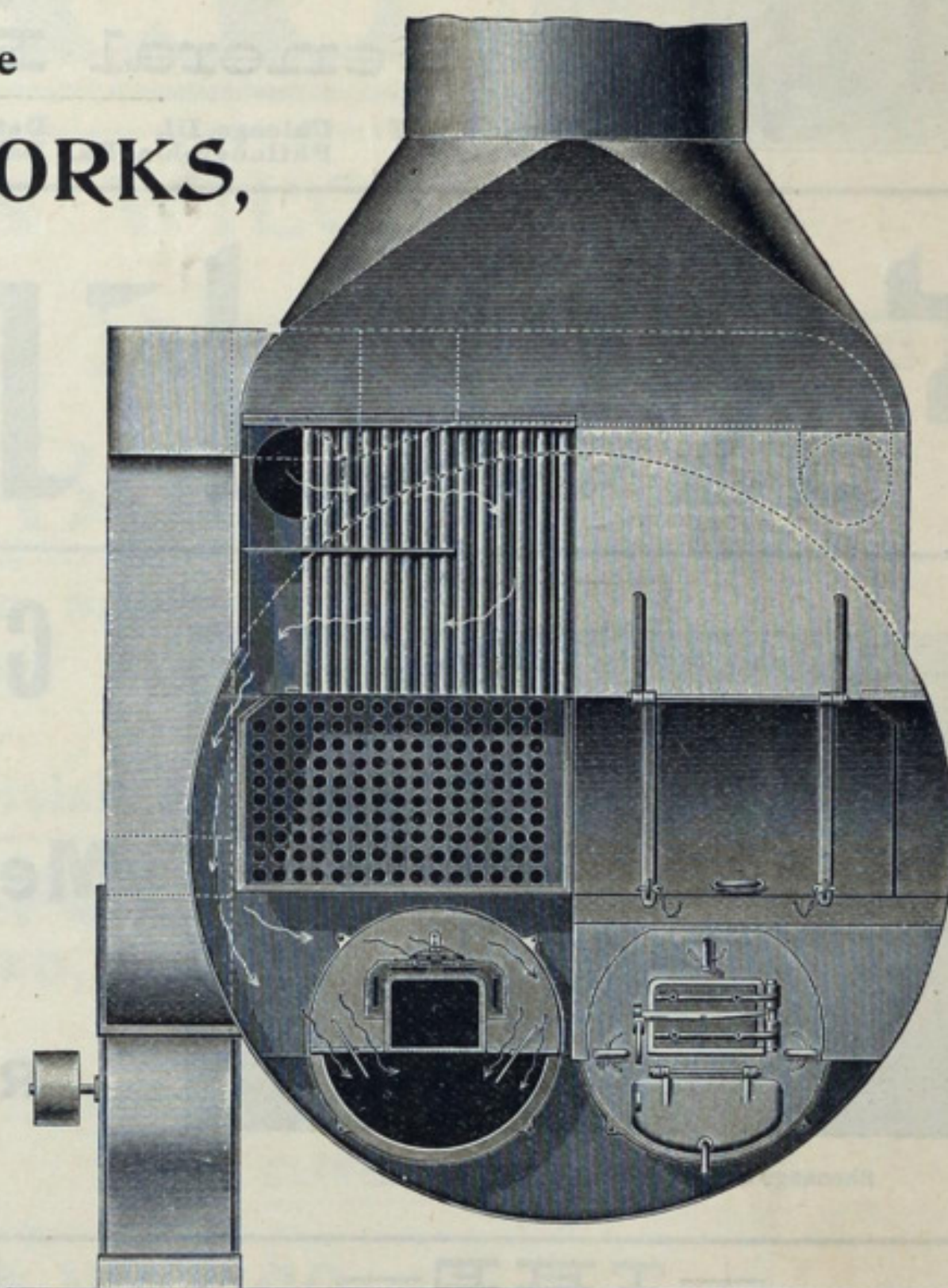
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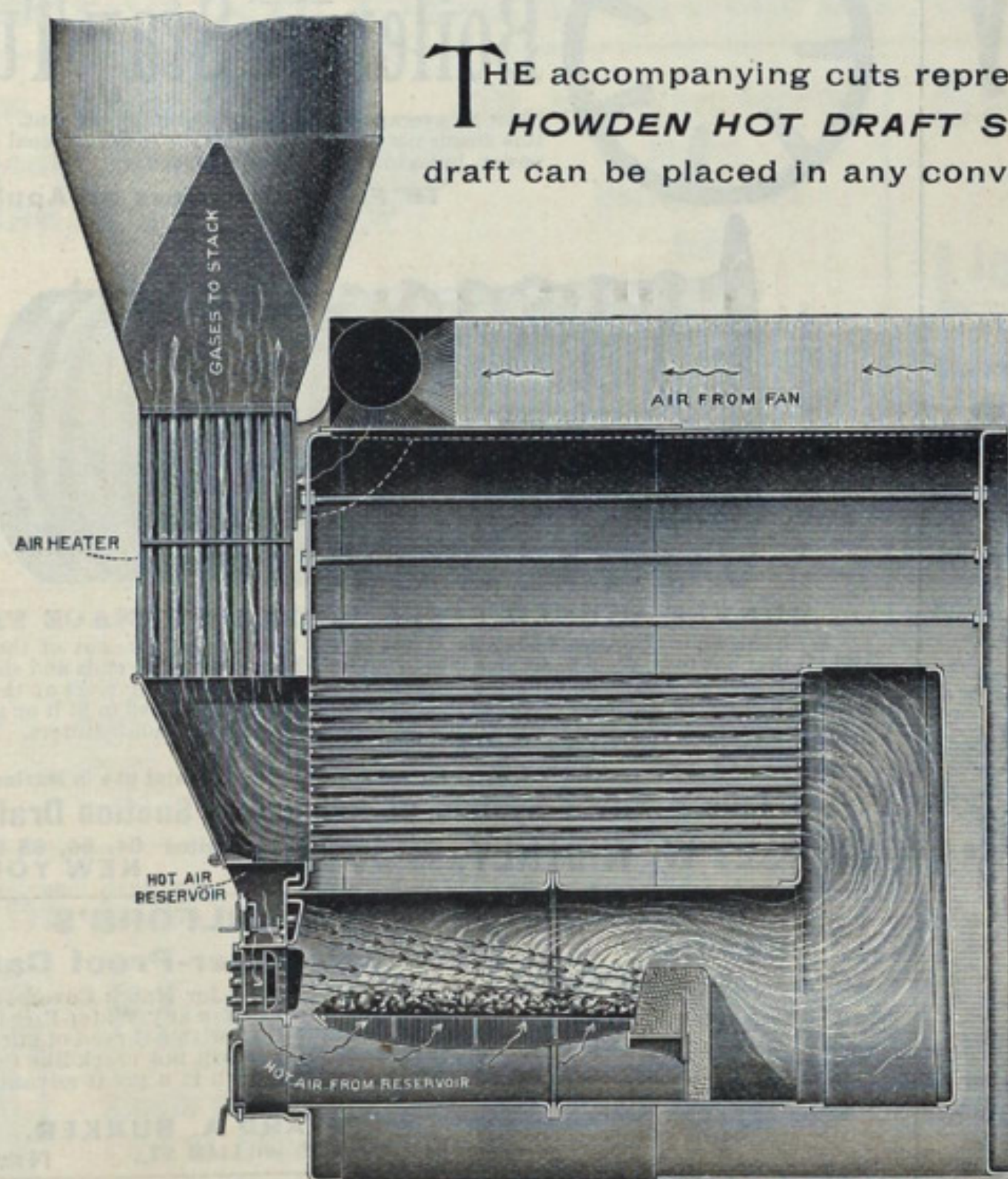
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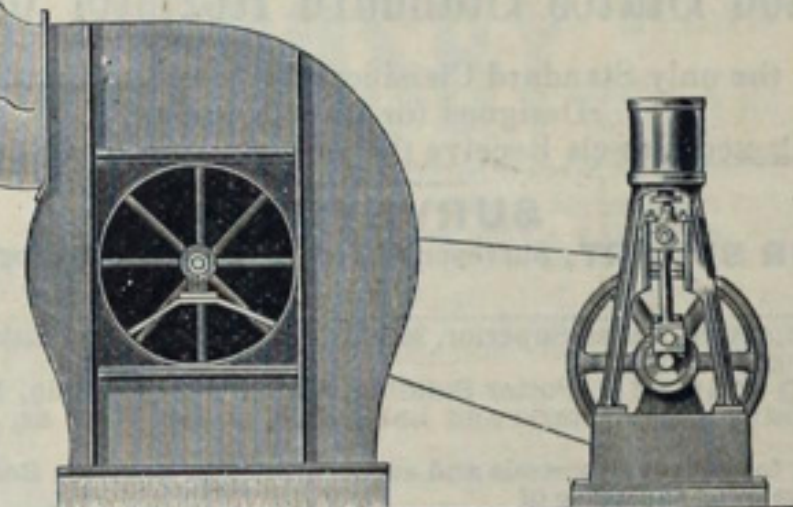


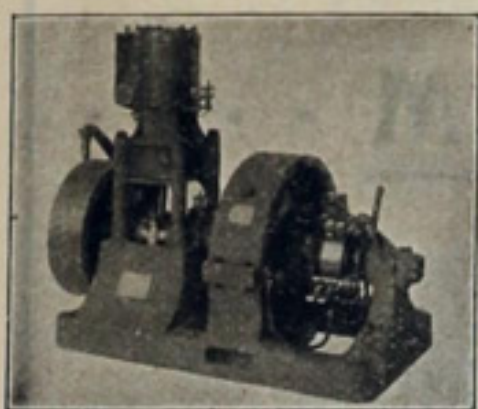
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SECTIONAL VIEW.

THE accompanying cuts represent sections of a single boiler equipped with the **HOWDEN HOT DRAFT SYSTEM**. The engine and blower for supplying draft can be placed in any convenient place, preferably in the engine room. The hot air from engine room is taken in and forced through the air duct to air heater, where it is heated by passing among vertical tubes, through which the escaping gases from the boiler pass. The heated air is led down in ducts around breeching and delivered under and over grates in sufficient quantities to get perfect combustion. The arrows in accompanying views illustrate the passage of air from blower. This is in general the principle of the **HOWDEN SYSTEM**.





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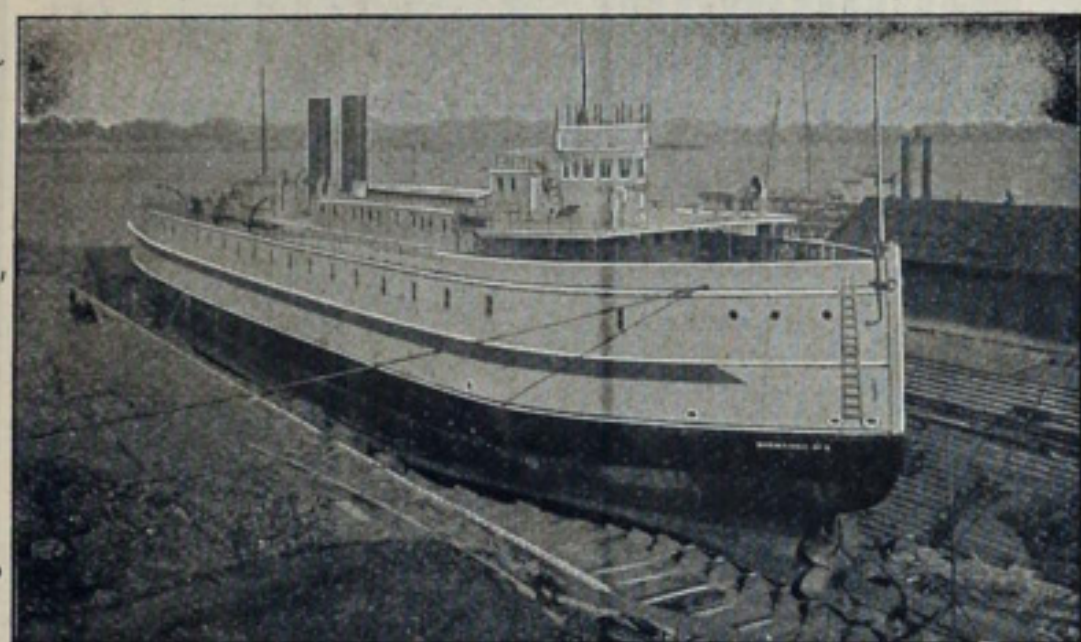
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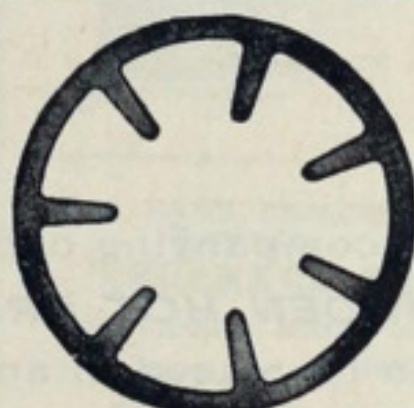
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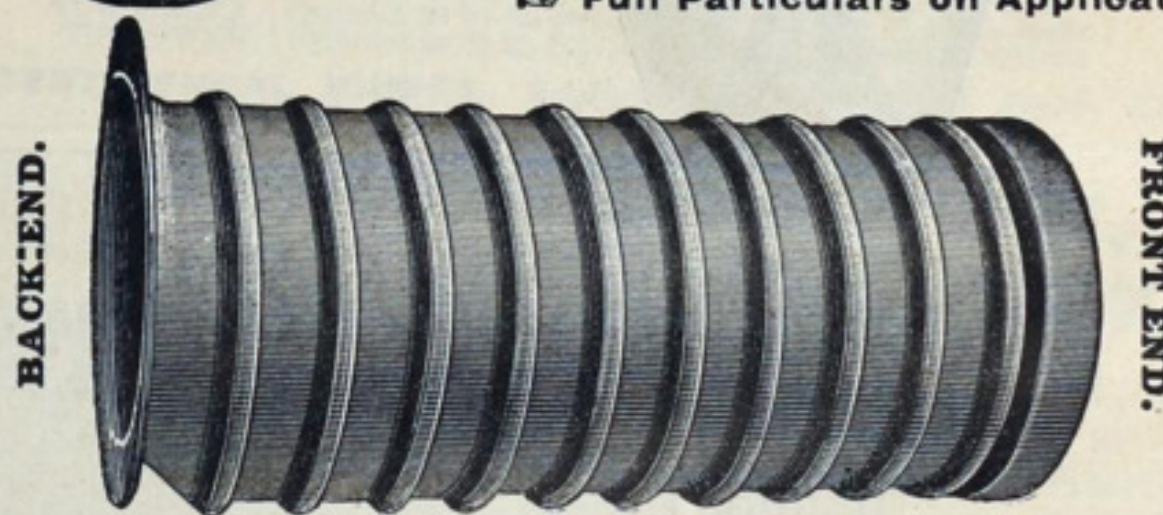
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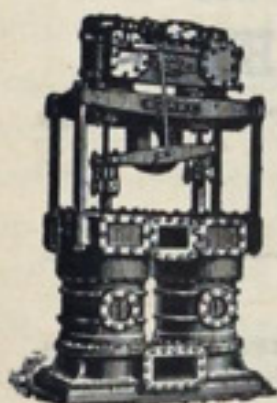
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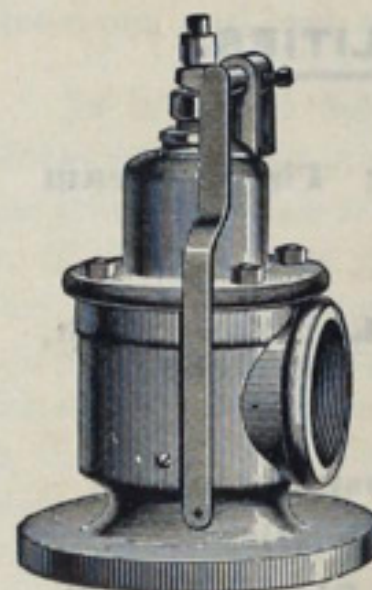
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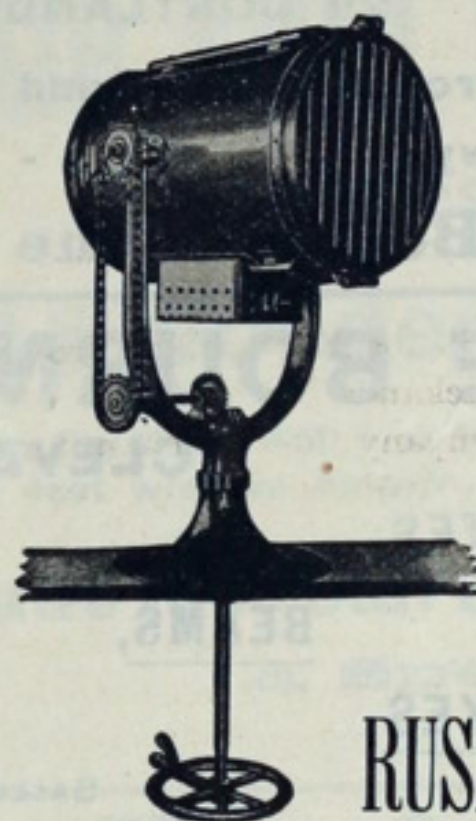
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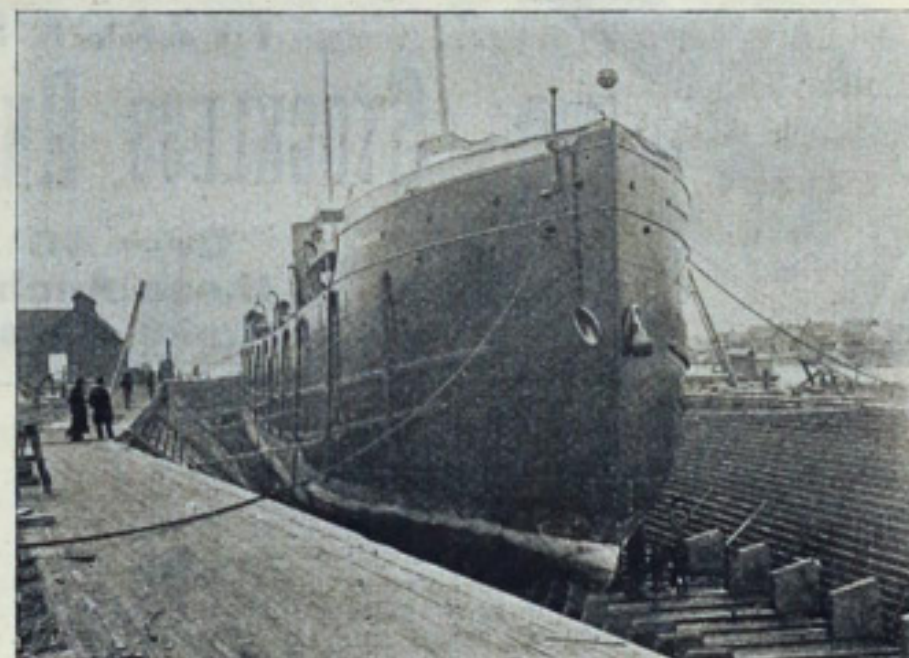
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